



Some Morphological Changes in the Jaw Bones Produced by Orthodontic Treatment.*

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In the study of vital processes in general, it is essential to understand some fundamental truths underlying all biological phenomena. It would be as fruitless to undertake a consideration of the form changes in the jaws without a general knowledge of what transpires within the structures constituting these bones, as it would be a waste of time and energy to enter upon a detailed description of the construction of a complicated machine without pre-supposing a definite understanding of the principles of physics. In order, therefore, to avoid any misconception of what I have to bring before you, let me imagine, for the sake of thoroughness, that you are not familiar with the processes involved, and allow me to place this problem in a manner as would be conducive to a clear understanding.

As maintained by Prof. T. H. Morgan, of Columbia University (1), "animals and plants are so constituted that one of their chief characteristics is that they respond to their natural environment in such a way as to insure their continued existence. These responses are in the main physiological, and therefore in large part transitory; but in some cases the response is structural, involving a temporary or even a permanent change in form and structure that persists, at least, as long as the external con-

*Read at the meeting of the Central Dental Association, Newark, N. J., October, 1914. A paper under the same title but of a more rudimentary character was also read by the author at the annual meeting of the Vermont State Dental Society in May, 1914.



ditions that called it forth remain. Thus, external conditions sometimes cause adaptive structural changes in organisms. We are familiar with some effects of this sort in our own bodies. Pressure on the skin, if long continued, causes it to become thicker and more capable of resisting the injurious effects of pressure. Sunlight tans the skin and protects it from 'burning.' It is said that cold causes the furs of some mammals to become thicker, and this change better protects them from cold. Conversely, it is said that horses and dogs lose their hair to some extent in warm climates. A number of arctic animals become white in winter. 'This change seems to be in part due directly to the cold, for it has been found if these animals are transferred to warmer climates, they show less marked changes on the approach of winter.' The changes, evidently, seem to be of benefit to the animal, directly protecting it from the agent that brings about the result as in the effects of pressure, cold, sunlight, etc.

The Cell and Intercellular Substance. If an inquiry be undertaken to determine the factors concerned in the processes that bring about these changes, we would discover that at the root of all vital phenomena there are involved millions of cells through whose activity all bodily functions are performed. It is the recognition of the cell theory during the last hundred years that has changed the knowledge of living organisms. Thus it is now sufficiently established that the cell is the structural unit of all living things, both in plant and in animal, and that all manifestations of life are accomplished by the chemical activity of the substances constituting the cell. As a result of this activity, the vegetative functions are performed, and the materials, termed intercellular substances, produced. The cells, then, together with the materials produced by their functional activity, compose the tissues of all living organisms. Furthermore, as Noyes (2) maintains, "all tissues are made up of cells and intercellular substances; the vital characteristics are given to the tissue by the cells, the physical characteristics by the intercellular substance. The intercellular materials present none of the vital manifestations, and are entirely dependent upon the cells for their formation and maintenance." There is, therefore, a constant reaction between the cell and the intercellular substance. If some bone cells, or bone corpuscles, of a living bone be devitalized, that portion of the tissue will become necrosed and form a sequestrum, the relation of which to the vital tissue is that of a foreign body. Also the fibres of fibrous tissue have no ability to grow, to attach themselves to any surface, or even to maintain their form without the presence of living fibrous cells or *fibroblasts*.

Adaptability of Connective Tissue.

The most characteristic peculiarity of living things, as Prof. Morgan maintains, is their ability to respond to the influences of their environment in such a way as to become better and better adapted to it. This property of adaptability in its widest sense, is the most significant characteristic of connective tissue, which, from the beginning of its development until it reaches the adult type, undergoes such changes as would render it most efficient to meet every possible requirement of its physical environment. This adaptation, brought about by the activity of the cells of that tissue invariably results either in an increased amount of intercellular substance, a destruction of this material, or a change of its character.

Characteristics of Connective Tissue.

Histology has taught us that the cells of connective tissue in general are very similar, and that the different forms of this tissue depend chiefly on the character and arrangement of their intercellular substance. In embryology we similarly learn that all connective tissues originate from a common form of embryonal connective tissue—the mesenchyme—and change from one form to another during development. These changes are the most important characteristics of this tissue and must be clearly perceived, if the nature of bone is to be appreciated. For instance, embryonal connective tissue is transformed into fibrous tissue; fibrous tissue becomes arranged into a definite membrane and is then transformed into cartilage, which in turn is infiltrated by calcareous deposits to adapt itself to its environment. Just as epithelial cells are specialized to respond to the stimuli of light, of pressure and of chemical action, which connect the organism with its environment, so connective tissue cells are specialized to respond to mechanical stimuli by producing materials which adapt it to mechanical conditions.

Bone.

Approaching our topic more closely, let us consider for a moment the tissue that most concerns us, namely, *Bone*. Dr. F. B. Noyes defines bone as “a connective tissue whose intercellular substance is calcified and arranged in layers around nutrient canals or spaces. The cells are placed in cavities, called lacunæ, between the layers, and receive their nourishment through very minute channels, called canaliculi, which radiate from them and penetrate the layers.”

The structural elements of bone are:

1. The matrix, or intercellular substance, which is always arranged in layers or lamellæ.

2. The cells or bone corpuscles which are embedded in the matrix between its layers.
3. The lacunæ or spaces in which the cells are found.
4. The caniculi or channels through the matrix by which the embedded cells receive nourishment.

Although these structural elements are present in all forms of bone, the varieties of this tissue may be classified according to the difference in arrangement of these elements. Noyes distinguishes the following three varieties of bone; Subperiosteal, Haversian system and cancellous. *Subperiosteal bone*, according to him, "must be regarded as primarily a formative arrangement and more or less transitory, in which the layers are arranged parallel with the surface under the periosteum. In the *Haversian system* bone the lamellæ are arranged concentrically around canals which contain blood vessels, nerves, and embryonal connective tissue, and from which the cells in the lacunæ are nourished. In cancellous bone the lamellæ are arranged in delicate plates surrounding large, irregular nutrient or marrow spaces. These are filled by embryonal connective tissue and contain blood vessels and nerves."

Transformation of Bone.

Under normal conditions the subperiosteal bone is composed of but a few layers. But when a considerable thickness is reached, processes are immediately set up, which begin to hollow out its substance by absorptions, and bone is rebuilt in the form of layers arranged concentrically around the channels formed. In this manner subperiosteal bone is converted into Haversian system bone. Between the Haversian systems there are remains of the subperiosteal layer (interstitial lamellæ) that were left by the absorption, and for that reason are called fundamental lamellæ or ground lamellæ. Haversian system bone is also called compact bone and constitutes the greater part of the shaft of the long bone and plates of the flat and irregular bones. This is never allowed to become greater in quantity than is necessary for strength, and when sufficient thickness has been formed, the deeper part is cut out by absorptions in the Haversian canals, converting them into large irregular spaces. The formation of a few layers around these spaces transforms the compact into cancellous bone. The plates of cancellous bone, however, are not arranged at haphazard, as might be supposed from casual observation, but are disposed of in definite arrangement, which is determined by the direction of stress on the compact bone that is supported by them. And finally the inner circumferential lamellæ, few in number, form the internal boundary next to the marrow cavity. They are not to be thought of in the same sense as the outer circumferential lamellæ surrounding the bone, for they are the layers which have been formed around

an enlarged nutrient or marrow space; while the marrow cavity itself is penetrated by very delicate spicules, in fact, the marrow cavity is produced by the spaces of cancellous bone becoming larger and larger until they become one continuous space. Thus, while bone is thought of as a hard and fixed tissue, it is continually being built and rebuilt. It is only

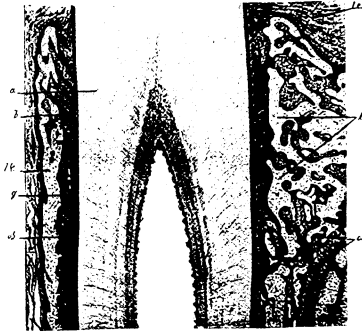


Fig. 1.

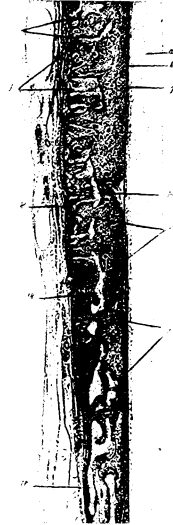


Fig. 2.

by the appreciation of these possibilities that we realize that bone, while a hard and rigid substance, is really a plastic tissue and is continually being modified by mechanical conditions to which it is subjected.*

The Alveolar Process.

The alveolar process anatomically consists of an outer and an inner layer of compact bone, and intervening between the two is a mass of cancellous tissue.

The relative quantity of the two forms of bone varies greatly in different individuals and in the different regions of the mouth in the same individual, depending upon the resistance they are called upon to yield. Where greater strain is exerted upon the alveolar process than it is alone able to withstand, those parts are reinforced by buttresses of compact bone for additional support, as in the premolar and molar regions by the malar process and its articulating bones, the malar and zygomata.

*For a more complete description of the processes occurring in the modification of normal bone tissue the reader is referred to the work of F. B. Noyes "Dental Histology and Embryology," Chapters XVIII and XIX, treating on Bone, Bone Formation and Growth.

Items of Interest

Histologically, we find these tissues, as previously mentioned, to consist of subperiosteal, Haversian system and cancellous bone. And that each variety depends, as stated above, upon the manner in which the cells and the intercellular substance are arranged. Furthermore, depending upon the mechanical conditions to which these tissues are subjected, the bone cells in these regions as well as elsewhere are ever ready to relinquish their adult form, assume their embryonal type, i. e., they become osteoblasts, and together with the osteoclasts they initiate those processes



Fig. 3.

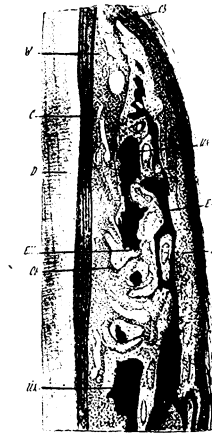


Fig. 4.

that result in the absorption and deposition of bone tissue. Under normal conditions this process may be observed during the period of the shedding of the deciduous dentures and eruption of the permanent series.

MacEwen's Experimental Evidence of Bone Growth.

Moreover, the process of bone transformation may also be set up by artificial means. As has been experimentally demonstrated by Sir William MacEwen (3), of Glasgow, "when stimuli are applied to bone, the cells in the interior proliferate and escape into the Haversian canals and are carried peripherally into the first space suitable for expansion, which is generally the subperiosteal areolar tissue." MacEwen demonstrated that as soon as the bone corpuscles are liberated from their confinement through stimuli, injury or operation, they assume their embryonal type and revert to their vegetative activities, i. e., they feed, grow and reproduce. He further proves that "the osteoblasts once formed have the power of direct and vigorous proliferation, are capable after dissem-

ination of growing in the midst of the soft tissues, of being carried by the blood stream and deposited in blood clot, where they proliferate after the matrix has been supplied with new formed blood vessels. The bone cell has the function of surrounding itself with a calcareous zone, which it controls under the agency of the trophic nerves." As long as the bone cell remains embryonic, it exhibits the power of proliferation; but when it reaches maturity, it assumes the fixed tissue type and becomes stationary, though the *proliferating potentiality still remains*. The extent to which the proliferation may be encouraged depends upon the agent which, while increasing and prolonging this power of the osteoblasts, must not lower its vitality.

Oppenheim's Experimental Evidence of Bone Transformation by Orthodontic Treatment.

In a series of experiments conducted by Dr. Albin Oppenheim (4), of Vienna, these fundamental principles were amply verified. With the aim in view of discovering the nature of the changes in the bone tissues, incident to orthodontic treatment, as well as the changes occurring during retention, Oppenheim utilized several baboons (*cynocephalus*) for his experiments. He adjusted the Angle orthodontic appliances upon their teeth, and after forty days of treatment killed the animals, imbedded and stained the tissues necessary and made microscopic sections for study.

In order to appreciate to what extent bone transformation occurred in these experiments, it will be of advantage to observe first the aspect of a section of a tooth and alveolar process under normal conditions, Fig. 1. Note in particular the arrangement of the bone spicules, constituting the alveolus, they being *parallel* with the long axis of the tooth; and observe the subsequent changes brought about. The first tooth movement performed was that of an incisor in the labial direction. Fig. 2 shows the changes after forty days' application of force. "We find here a complete architectural reconstruction of the labial alveolar wall which in the entire extent of its occlusal two-thirds, consists exclusively of spongy bone spicules arranged perpendicularly to the long axis of the tooth. There is nothing visible of the original lamellar arrangement of the compact bone. The young bone, hardly calcified, very rich in cells, is densely beset with osteoblasts both on the tooth side as well as on the opposite side. The osteoclasts are seen only singly; the processes of deposition have under the influence of continued pressure gained a decided advantage over those of resorption. In the apical third of the root the bone possesses again its normal structure, the lamellæ being arranged in the longitudinal direction of the tooth. It forms again true compact bone." (Oppenheim.)



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.

The changes of the lingual alveolar wall are no less remarkable. We find there just as complete and characteristic changes. The architecture of the bone, Fig. 3, has undergone a total reconstruction, and shows a complete deviation from the normal preparation. The characteristic differences are best obtained by a comparison with the architectural construction and arrangement of the spongy bone spicules in the normal preparation, Fig. 1. They consist, as you will see, especially in the gin-

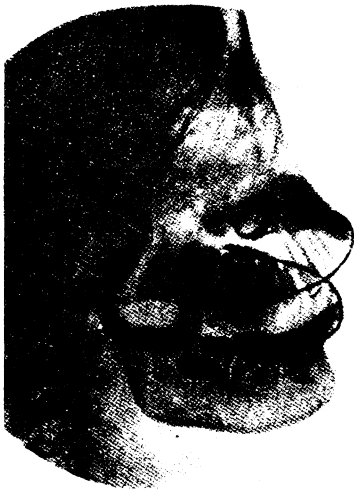


Fig. 9.



Fig. 10.

gival half of the root of the original massive spongy bone spicules, which are mostly arranged in the direction of the pull; i. e., they are transformed into bone spicules arranged perpendicularly to the long axis of the tooth. The extremities of the spicules directed toward the tooth are densely beset with osteoblasts and show uncalcified zones, indicating growth in length and breadth of each spicule. On the extremity pointing away from the tooth we find quite numerous osteoclasts and phenomena of resorption. This proves conclusively that responding to the stimuli of mechanical pressure exerted by orthodontic appliances the bone reacts by a transformation in its structure.

During retention (5), these conditions again undergo some modifications, the bone structure returning to its original form, Fig. 4. That



the bone underwent some transformation can readily be seen when we compare again this view to the normal section, Fig. 1, and observe the uncalcified zones or osteoid tissue still being present.

These experiments prove without doubt that due to the pressure exerted upon the teeth individually by orthodontic appliances, there is a reaction taking place in the substance of the bone, exhibiting histological changes in the structural elements and producing a modification of the architectural arrangement of the bone spiculæ adaptive in nature.

Hauptmeyer's Radiographic Evidence of Bone Changes.

The anatomical effect upon the jaw bone as a whole, when pressure is exerted upon the teeth collectively; i. e., upon the dental arches, assumes a different aspect. Thus, when intermaxillary force is employed in the treatment of a Class II or Class III (Angle), the mandible undergoes a change in its form in order to adapt itself to a position in response to the force exerted, restoring the teeth to their normal occlusal relations. In an endeavor to ascertain the character of these changes, Friedrich Hauptmeyer (6), Essen, Germany, undertook the investigation of the problem in the following manner: He prepared radiographs of the jaw bones before treatment, showing the relation of the condyle and coronoid processes of the mandible to the ascending ramus, and the degree of the angle presented by the latter in its relation to the body of the bone. After several months of application of intermaxillary force, another X-ray was taken, and when the treatment was completed, the final radiographic record was made. Thus, Fig. 5 represents a Class II (Angle) case of malocclusion, twelve years old, before treatment; Fig. 6 the same case after about four months of treatment, and Fig. 7 after nine months of treatment. Note the change in position of the condyle and that of the coronoid process. Also note that the sigmoid notch has changed in form and outline. The angle of the jaw has changed in degree and the alveolar process of the mandible seems to have shifted forward, as can be seen by the distance between the last molar tooth and the ramus as well as by the space created between the last two molar teeth.

Fig. 8 represents a Class III case of malocclusion, ten years old. In the treatment of this case force was exerted in the opposite direction. The resultant changes, as may be expected, are therefore in reverse order. As evident in Figs. 9 and 10, the condyle and the coronoid process have migrated in opposite directions, resulting in an inverse change in the outline of the sigmoid notch, the obtuse angle of the jaw has become more acute, and the ramus has also increased in width.

The Author's Clinical Evidence.

I have hitherto endeavored to call your attention to the possibilities of bone transformation in general, to the changes occurring in the alveolar process during individual tooth movement and to the anatomical alterations of the mandible, during collective tooth movement, produced by orthodontic means. In order to appreciate the results obtained by the

Fig. 11.

Fig. 12.

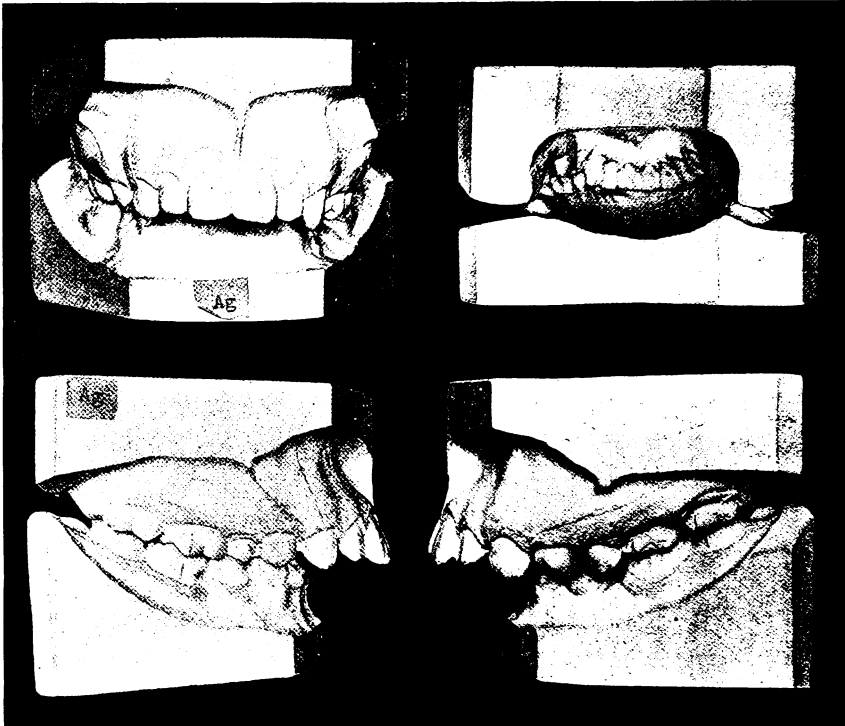


Fig. 13.

Fig. 14.

treatment of three practical cases, I would ask that you bear in mind these important facts, and consider the clinical evidence from such a viewpoint, as will convey the real significance of orthodontic attainments.

Case I, Figs. 11, 12, 13 and 14, presents a form of malocclusion designated as Class II, Division 1 (Angle classification). The patient, a girl, fifteen years old, in good health, normal weight and height, though rather pale in complexion. The deformity was largely due to a habit of pressing a piece of bread against the anterior part of the palate, holding it there with the tongue and sucking it for many hours at a stretch. The

Items of Interest

upper dental arch, Fig. 15, is considerably increased in size, as evidenced by the spaces in the premolar and canine region, and the rotated positions of the former. The lower dental arch, Fig. 17, on the other hand, is greatly reduced in size, due to the absence of both second premolars and their obliterated spaces. The effect of the condition may readily be appreciated when the models in occlusion are again studied, Figs. 11, 12, 13

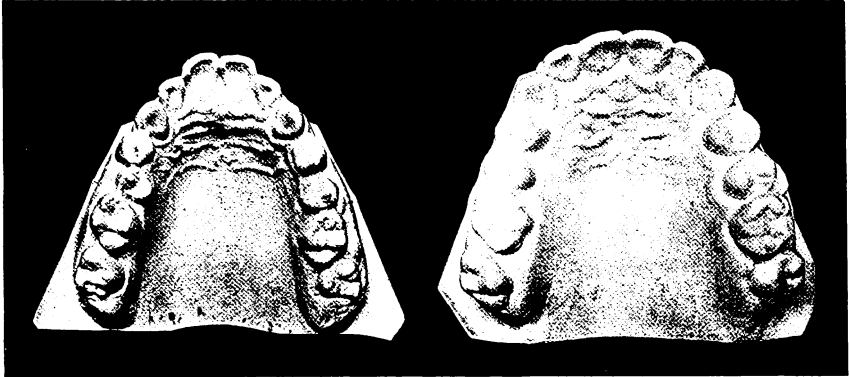


Fig. 15.

Fig. 16.

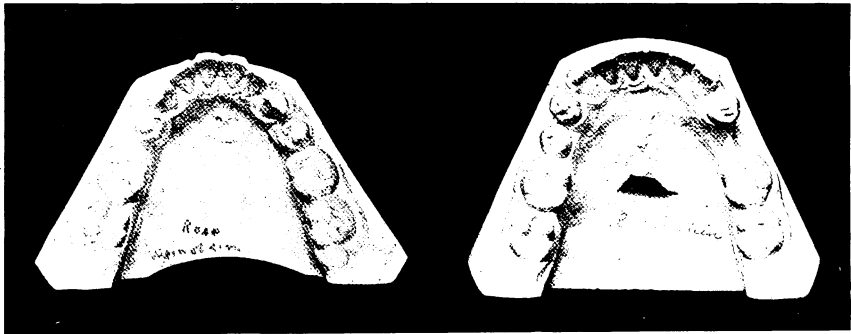


Fig. 17.

Fig. 18.

and 14. Mastication was defective, since only a part of the masticatory apparatus was performing its function; nasal respiration was interfered with, since the mouth could not be kept normally closed, due to the malrelation of the teeth in the anterior region; speech was affected, due to the disharmony in the sizes of the dental arches, to the decrease in size of the lower arch, limiting the area of activity of the tongue, and to the malrelation of the incisors, many sounds in our speech depending upon the normal position of these teeth; and finally, facial expression was marred. Figs. 19, 20, 21 and 22 show the corrected condition, of which

models were obtained one year after the retaining appliances were removed.

If an examination be now undertaken to discover the extent of modification in the size and form of the dental arches and alveolar processes obtained during treatment, it will be found that though a consider-

Fig. 19.

Fig. 20.

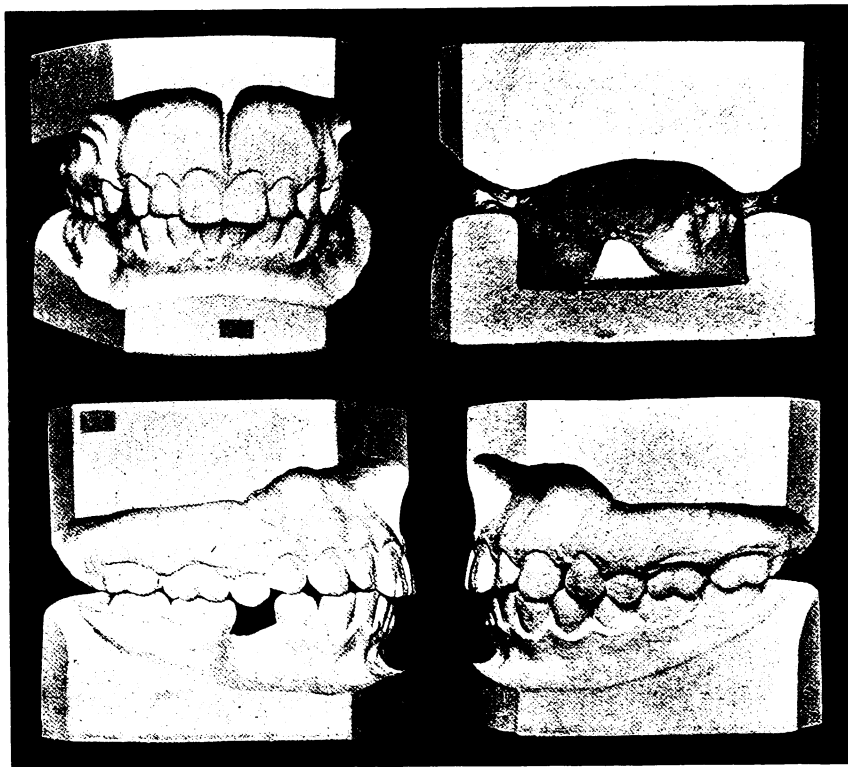


Fig. 21.

Fig. 22.

able transformation occurred in the upper dental arch, Figs. 15 and 16, it is insignificant when compared with the change that has taken place in the lower jaw, Figs. 17 and 18. To convey a clear conception of the character and extent of this modification, accurate measurements were made from certain points and the figures obtained, recorded in Table I. Two series of measurements were tabulated; one series was taken at the lowest linguo-gingival points of the teeth involved, and the other at the disto-incisal angle of the lateral incisors, the cusp points of the canines,



the lingual cusp points of the premolars and the mesio-lingual cusp points of the molars. All measurements were made in millimeters.

If a comparison be made between the figures obtained in the "difference" of the one series of measurements and that of the other, the manner in which the tooth movement occurred will be evident and its in-

Table I.

TRANSVERSE DIMENSIONS

Measurements in Millimeters		At gingival margin			At occlusal points		
From	To	Before	After	Difference	Before	After	Difference
L. I. 2.	R. I. 2.	12.8 mm.	17.1 mm.	4.3 mm.	22.5 mm.	27.9 mm.	4.6 mm.
L. C.	R. C.	18.7 "	20.0 "	2.3 "	25.4 "	29.0 "	3.6 "
L. Pm. 1.	R. Pm. 1.	26.4 "	26.4 "	0.0 "	30.2 "	30.2 "	0.0 "
L. M. 1.	R. M. 1.	32.0 "	34.3 "	2.3 "	33.0 "	34.7 "	1.7 "
L. M. 2.	R. M. 2.	39.5 "	39.4 "	0.1 "	40.7 "	40.7 "	0.0 "

MESIO-DISTAL DIMENSIONS

L. M. 1.	R. I. 1.	24.7 mm.	27.2 mm.	2.5 mm.	32.0 mm.	34.7 mm.	2.7 mm.
R. M. 1.	R. I. 1.	25.5 "	28.2 "	2.7 "	30.8 "	34.7 "	3.9 "
L. M. 1.	L. Pm. 1.	10.3 "	15.8 "	5.2 "	9.8 "	15.4 "	5.6 "
R. M. 1.	R. Pm. 1.	10.3 "	16.9 "	6.6 "	7.5 "	16.3 "	8.8 "

NOTE.—L, left; R, right; I, incisor; C, canine; Pm, premolar; M, molar.

fluence upon the alveolar process appreciated. It may also be mentioned here that the eruption of the left, lower second premolar occurred immediately, when sufficient space was obtained; that on the right was found after radiographic examination to be missing. The change in the horizontal plane and the vertical position of the teeth as well as that of the alveolar process may further be seen in Figs. 23, 24, 25, which represents models of the lower dental arch obtained at the beginning of treatment, at an intermediate stage and at the completion of the case.

Case II presents a condition which is diagnosed as Class III (Angle). The patient, a boy, thirteen and a half years old, in apparent good health and normal both in stature and weight, though quite nervous. The character of malocclusion in this case is represented in Figs. 26, 27, 28 and 29. The front view shows the lingual relation of the entire upper dental arch; the right lateral view shows the character of the influence of this

condition upon the alveolar upper processes and the absence of the upper right canine due to impaction, the space of which is entirely closed up; the left lateral view shows similar characteristics as the right, and also shows the delayed eruption of the lower left premolars; the rear view illustrates the extent of the malrelation of the anterior teeth as viewed from within. The disturbance brought about by this condition in the functions of mastication, respiration and speech were considerably more

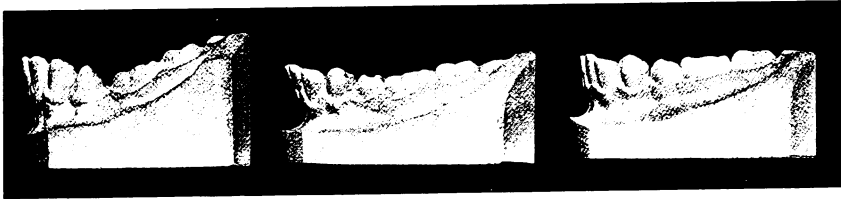


Fig. 23.

Fig. 24.

Fig. 25

aggravated than in the previous case, and facial expression was extremely marred.

In this case, unlike the one previously described, it was the upper dental arch that presented an extremely under-developed condition, and which, during treatment, underwent the greatest amount of modification. As seen in Figs. 30 and 31, the occlusal views of the upper dental arches before and after treatment, the increase in size occurred both in the lateral and antero-posterior dimensions, and the change in form involved not only the dental arch and alveolar process, but also the palate. These remarkable changes may further be emphasized by the figures obtained from the measurements recorded in Table II. These measurements were obtained in a similar manner as those tabulated in the case above, excepting those of the lateral incisors, which were taken at the mesio-incisal angle.

A close study of these figures will reveal the fact that although the movement of the teeth has been extreme, yet they have been so performed that the longitudinal axes of the teeth have not been unfavorably placed in their relation to the horizontal occlusal plane of the dental arch. Figs. 32, 33 and 34 show the case after completion, models of which were obtained one year after the retaining appliances were removed.

Case III, Figs. 35 and 36, presents a condition which is of keen interest from a different aspect. It is a case belonging to Class I (Angle). The patient, a young girl, fourteen years of age, suffering extremely from defective nasal breathing, and its allied disturbances, colds, etc. This

Fig. 26.

Fig. 27.

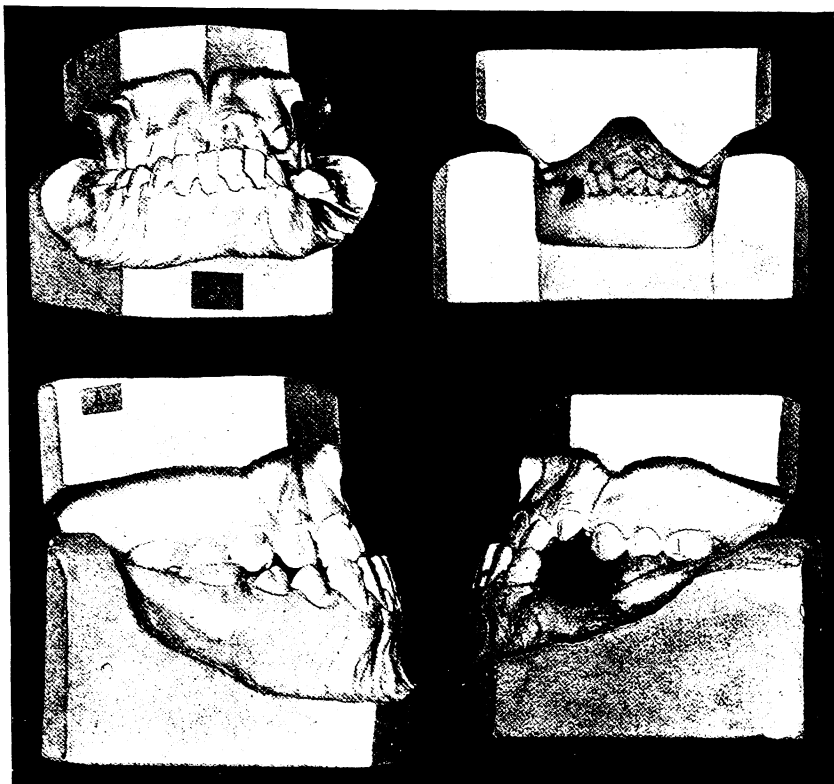


Fig. 28.

Fig. 29.

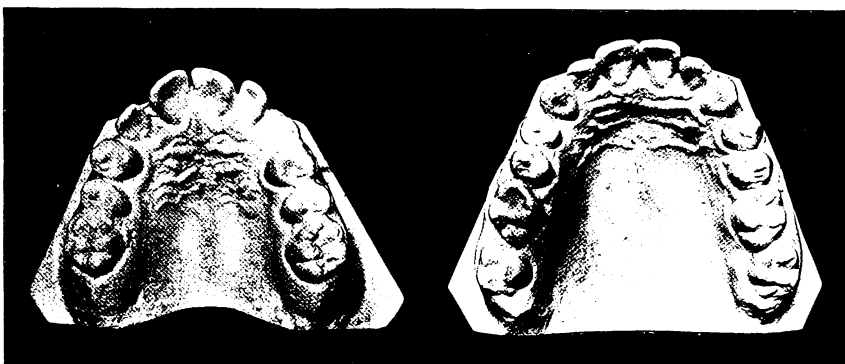


Fig. 30.

Fig. 31.

form of malocclusion probably due to excessive adenoid vegetation in the naso-pharynx, and the consequent habitual mouth breathing, consists of a lack in the transverse development of the upper dental arch and the influence of this upon the formation of the palate. As the interesting

Table II.

TRANSVERSE DIMENSIONS

Measurements in Millimeters		At gingival margin			At occlusal points		
From	To	Before	After	Difference	Before	After	Difference
L. I. 2.	R. I. 2.	17.2 mm.	19.0 mm.	1.8 mm.	20.5 mm.	20.0 mm.	0.5 mm. less
L. Pm. 1.	R. Pm. 1.	21.9 "	27.1 "	5.2 "	27.2 "	32.8 "	5.6 "
L. Pm. 2.	R. Pm. 2.	27.5 "	33.1 "	5.6 "	32.7 "	37.5 "	4.8 "
L. M. 1.	R. M. 1.	29.5 "	34.8 "	5.3 "	37.5 "	39.0 "	1.5 "

MESIO-DISTAL DIMENSIONS

L. M. 1.	L. I. 1.	27.8 mm.	31.0 mm.	3.2 mm.	39.0 mm.	39.2 mm.	0.2 mm.
R. M. 1.	L. I. 1.	20.0 "	28.2 "	8.2 "	34.0 "	37.0 "	3.2 "
R. Pm. 1.	R. I. 2.	5.5 "	11.0 "	5.5 "	10.6 "	11.1 "	0.5 "

feature in this case is centered mainly upon the upper dental arch with its alveolar process and the palate, measurements were obtained (see Table III) to ascertain the extent of the lateral increase in the size of the former, and sections made of impressions of the palate to discover the nature of the effect produced by the treatment.

Thus, while these figures reveal the enormous extent to which tooth movement occurred, it conveys no idea as to the effect this treatment had upon the real disturbance; i. e., the relief of mouth breathing. While the removal of the adenoids by the rhinologist cleared the nasal passages of obstructions, the passages themselves were extremely constricted, as may be seen by the formation of the palate, Fig. 37. In order, therefore, to demonstrate the effect of orthodontic treatment upon the form of the palate, impressions were taken of the models obtained before treatment, Fig. 37, and of those after treatment, Fig. 38. Cross sections were then prepared as indicated in the figure and diagrams made by tracings of those sections. The comparative tracings were then accurately



measured and the figures obtained indicated in Fig. 39. The last column in the illustration represents a composite diagram of the sections before and after treatment.

Reiterating the remarks made in the discussion of our topic, the

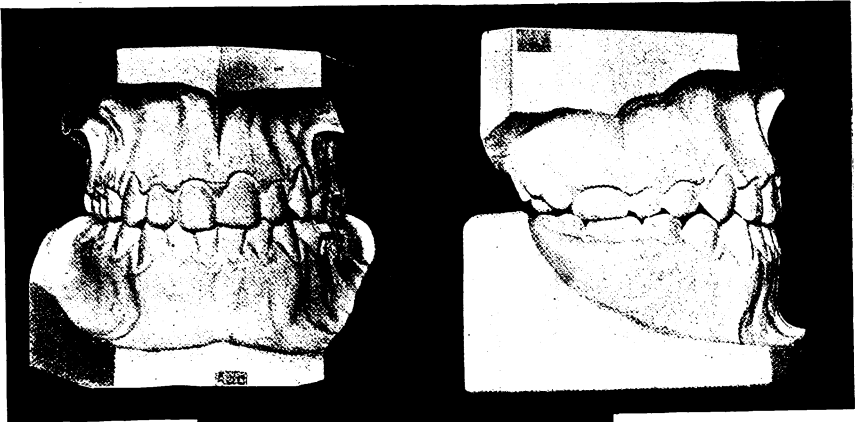


Fig. 32.

Fig. 33

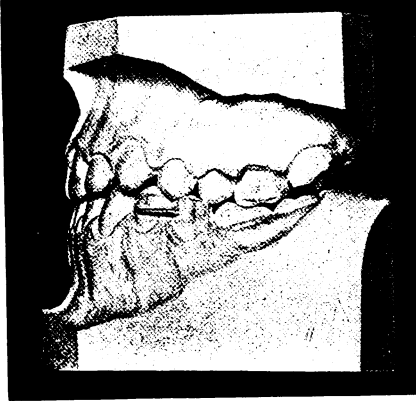


Fig. 34

main contentions may be gathered into the following focal points:

1. That, while one of the chief characteristics of lower animals and plants is to respond to their natural environment in such a way as to insure their continued existence, in higher animals, these characteristics are manifested by certain tissues specialized for the purpose.

2. That some of the tissues organized to adapt the higher animals to the mechanical conditions in their immediate environment are those designated as *connective tissues*.

Orthodontia

3. That bone is that form of connective tissue in which its inter-cellular substance is calcified and arranged in layers around nutrient canals or spaces. And that bone, while a hard and rigid substance, is

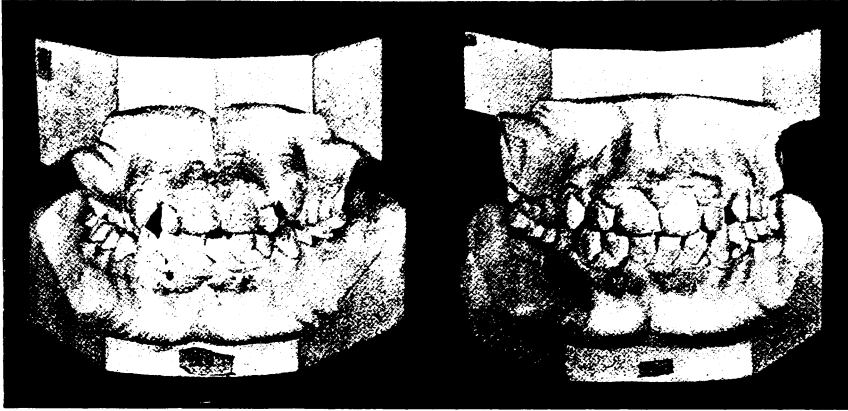


Fig. 35.

Fig. 36.

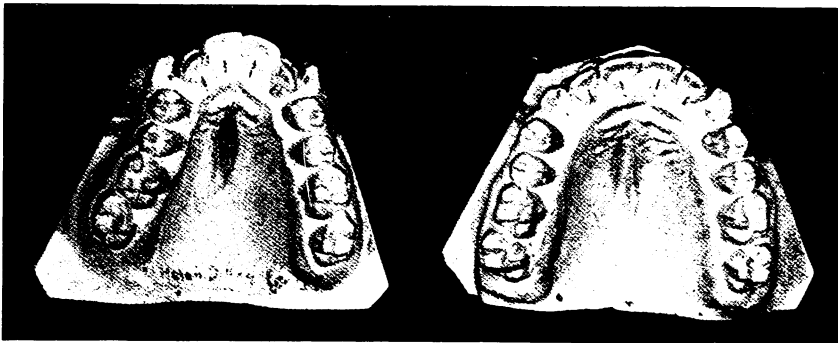


Fig. 37.

Fig. 38.

really a plastic tissue and is continually being modified by the mechanical conditions to which it is subjected.

4. That the alveolar processes and their adjacent bony structures, being constituted of the same structural elements as bone tissue in general, are governed by the same general laws; i. e., their form is dependent upon the mechanical conditions to which they are subjected.

5. That an artificial alteration of these mechanical conditions will produce a relative change in structure and form of the parts involved.

Items of Interest

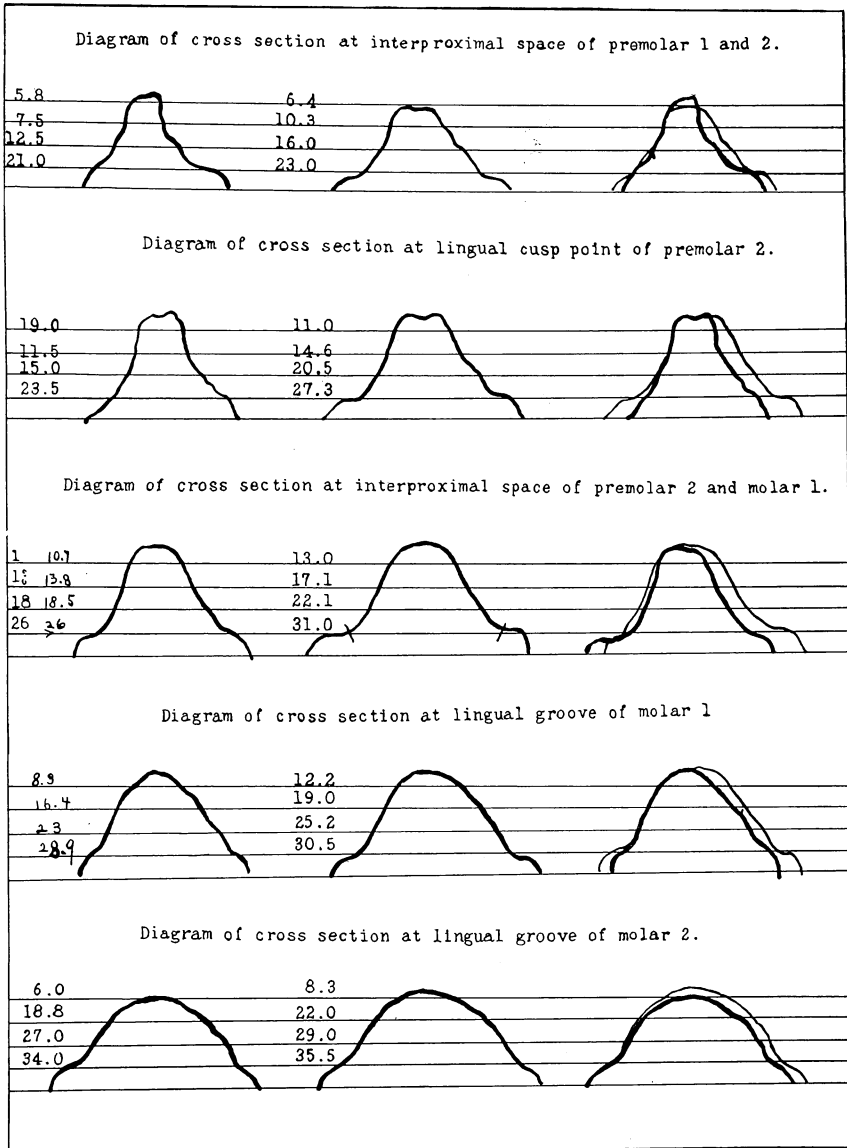


Fig. 39.



This modification will persist when adaptive in character; i. e., when it is of advantage to the existence of the individual, and when the conditions that brought it about persist or are substituted by function.

6. That, as malocclusion of the teeth has been recognized to be due to malformations in the jaw bone, the teeth themselves being but diagnostic landmarks, the corrective measures are based upon mechanical stimulation of the tissues involved, and applied in such a manner as to alter the bones in their form, size and position, so as to be in harmony with the other related parts.

Cable III.

TRANSVERSE DIMENSIONS

Measurements in Millimeters		At gingival margin			At occlusal points		
From	To	Before	After	Difference	Before	After	Difference
L. I. 2.	R. I. 2.	12.7 mm.	17.8 mm.	5.1 mm.	19.7 mm.	28.5 mm.	8.8 mm.
L. C.	R. C.	27.5 "	28.0 "	0.5 "	32.7 "	36.5 "	3.7 "
L. Pm. 1.	R. Pm. 1.	20.0 "	29.0 "	9.0 "	23.1 "	35.0 "	11.9 "
L. Pm. 2.	R. Pm. 2.	23.0 "	33.9 "	10.9 "	27.8 "	38.4 "	10.6 "
L. M. 1.	R. M. 1.	23.0 "	35.8 "	12.8 "	34.4 "	44.2 "	9.8 "
L. M. 2.	R. M. 2.	36.5 "	38.9 "	2.4 "	42.1 "	46.4 "	4.3 "

And finally, as it has been shown, modern orthodontia, aiming at the restoration of the function of mastication, and that of respiration, the correction of defective speech and the esthetic improvement of facial expression establishes by its therapeutic means such mechanical conditions that result in morphologic changes of the parts involved.

Bibliography.

1. Morgan, T. H., Experimental Zoology.
2. Noyes, F. B., Dental Histology and Embryology.
3. MacEwen, Sir William, The Growth of Bone.
4. Oppenheim, Albin, Tissue Changes, Particularly of the Bone, Incident to Tooth Movement, American Orthodontist, Vol. III, Nos. 2 and 3.
5. Idem, Changes in the Alveolar Process during Retention, Okklusionsanomalien der Zähne, Angle, Second German Edition, 1912.
6. Hauptmeyer, Friedrich, Ueber die Anatomischen Veränderungen des Unterkiefers, etc., Deutsche Monatsschrift fuer Zahnheilkunde, Maerz, 1913.



Discussion of Dr. Hellman's Paper.

When I first received a copy of Dr. Hellman's **Dr. Charles A. Spahn.** paper, the discussion of it appeared to be a most difficult matter. I have read it carefully and it is impossible to find any point with which I could disagree.

Dr. Hellman has credited in his paper the authors from whom he has quoted, and I may say that the works of Dr. Oppenheim and Dr. Noyes have been very profitable to me, and in my last paper before the Tri-County Dental Society, and also at the meeting of the Academy of Medicine in Newark, I tried to make clear the changes taking place in the bone during tooth movements. I drew many of my deductions from the work of Murphy, MacEwen, Davenport and Albray. Anyone interested in this particular subject will know of their work, and their ideas regarding the stimulation of bone growth. Dr. Albray has grown bone in the spinal column through certain stimuli to which he has subjected the bone. The peculiarity of our particular branch is that we have a tooth surrounded with bone, with a cushion between, in which to create the stimulation in a very mild yet sufficient way, which is something we do not find in any other part of the body.

It is difficult for me to decide which theory is correct. I know that Murphy, of Chicago, has an entirely different theory from that of MacEwen and Davenport, and Albray disagrees with the other three, while I adhere strictly to the teachings of Noyes and Oppenheim because I believe that, being specialists in this particular branch, they certainly are in a better position to judge which is correct. Nevertheless, the fact that many of these experiments have been carried on in the mouths of primates, makes us unable to say whether the same conditions or growths take place in the human beings as in the primates.

Was it a baboon that these experiments were carried on with, Doctor?

Dr. Hellman. Yes.

I take it for granted the changes would be the same, still we might find something quite different in the bones of the human being—say that of a child ten years of age—from what we find in the bone of the primate under experiment. It is impossible to take sections of human bone, while under treatment, unless we might get it right after death from accident or something of that kind, which would probably be very valuable.

The question of growing bone is not very well understood by the dental profession or the medical profession either, for only a few days ago I heard a physician testify that bone could not be enlarged or grown after it is once ossified.



The impatience of the orthodontist to obtain results is his greatest obstacle, because (as Dr. Hellman has pointed out to-night) the spiculae which grow in the direction of the pull should be made to grow very slowly. However, we find some patients can permit a great deal faster movement than others, but at the same time, to be on our guard and to be on the safe side, as Dr. Hellman has pointed out to us, the bone spiculae in elongating should be made to elongate slowly.

The slides shown to-night were very impressive, and if we could see them with the eyes and knowledge of Dr. Hellman we might be benefited a great deal more.

Dr. Hellman shows that orthodontic work is not only the straightening of the teeth, but the changing of the entire individual to some extent. I am sorry Dr. Hellman has not presented photographs of his patients, for I am sure they would be of a great deal of benefit. In those pictures we could see what a wonderful change has taken place in the face of the patient under Dr. Hellman's care—how a mouth breather has been changed to a normal breather; how the nasal spaces have been diverted and the entire facial expression changed from abnormality to beauty. In addition to that, the entire physical condition of the patient is improved. Not only have the jaws and the soft tissues been changed and improved, but two-thirds of the patient's head has been improved, and the benefit cannot be overestimated.

Dr. Hellman has shown an effect which cannot be disputed; we can only give him credit and thank him for the work he has done in orthodontia, not only at this particular meeting, but in other highly scientific papers we have had the pleasure of reading in the magazines.

The great array of facts brought out by the essayist this evening shows the great necessity for good dentistry or the normal occlusion of every filling inserted by the practitioner.

As he has pointed out, in order to have a normal and healthy growth of the maxillary bones they must be subjected to normal strain in all directions. This, in my opinion, means that we must discard the time-honored flat amalgam filling and substitute gold inlays, properly carved in the wax pattern.

It may be urged that the cost of the inlay is too great and that many patients cannot afford to have the best possible work we can supply. It is, I believe, all a matter of education; what we must do to best serve the public is to teach them the prime importance of good dentistry. Once a layman appreciates the importance of proper occlusion he will find a way to afford to pay for it.



Proper occlusion means, more than any other factor, a clean mouth and healthy oral mucous membrane, good mastication, good digestion and proper assimilation.

In conclusion I would say that the study of orthodontia by the ordinary practitioner, regardless of whether or not he intends to practice it as a specialty, will do more to promote progress in the art of dentistry than any other branch of study we can pursue.

Were it not for men like Dr. Hellman and others who have spent much time in investigation and research in this department, tabulating their findings and giving them to us, we would be very much in the dark as to what we could do and as to what we ought to expect.

There is one point that seems to me to be proof absolutely of the fact that we can develop bone and bring about the changes we desire in the position of the teeth in orthodontic work. For example, I am about finishing a very bad case of infra-occlusion, and I was at one time very much disturbed because I thought I might draw the teeth entirely out of their sockets. I went down to consult Dr. Waldron, as I do when I get in trouble, and we talked the matter over. I then applied what I considered the right degree of pressure on the six anterior teeth in either jaw, and that gentle pressure has been on now for nearly a year, and the infra-occlusion has been entirely corrected and the bite is normal in front. I measured those teeth from the cutting edge of the teeth to the cervical margin of the gum, and I found there is not a millimeter of elongation of those teeth from their sockets. Therefore, I must have brought down the process of the upper jaw and brought up the process in the lower jaw, and they have followed the teeth, and the bone has developed and grown. I speak of that because in such cases we sometimes feel there is danger of the teeth being extruded, but if the pressure is not too strong and is applied in the right way, and the case well watched, we need not fear.

I had hoped that Dr. Hellman would speak more particularly of assisting teeth in eruption, so that we might realize that there is actual development caused by the stimulation that occurs when any of the adjoining roots are moved in the bone.

The paper presented to you to-night by Dr. Hellman contains points of great interest. What I want to call particular attention to is the fact that he laid great stress on defective bone. It is true that from lack of bone growth we have irregular or maloccluding teeth; where we have the normal growth of bone in the human being we find the normal dental growth as required by nature.

Dr. Wilbur Daly,
New York.



There are many features presented in the paper to-night, concerning which issues could be raised, but the feature I would like to call particular attention to is that of the ages of the patients, work upon whom has been shown. The question is, when will we get normal growth of bone in those cases? Many years ago, when I was correcting cases at the age of from twelve to twenty, I found I did not get as good results as I do now, the reason being that I found that much longer time was required for retention. The period of active bone growth had passed, and therefore the bone was not of so dense or solid a nature as during the formative or growing bone period. With that in view I have advocated for many years the early treatment of malocclusion.

I fully agree with Dr. Daly as to the bone growth in the maxillary region during the period he mentioned, but growth really never stops up to about the eighteenth year. There is, however, always a decrease in the rate of growth, and with stimulation we can aid it considerably, as is shown in the cases he mentioned.

Dr. Taylor said he did not know how to get hold of an erupting tooth. There is not always a necessity for that. Give a tooth a chance, give it its proper space, and it will usually take its position in the arch. In the cases shown the unerupted teeth were not touched; all that was necessary was to make room for them. Sometimes you may lose patience and think they never will come into position, but just wait and they will erupt.

I am very happy to have met such an interested audience, and it has given me a great deal of pleasure to be with you.





A Case of Severe Hemorrhage after Extraction.

By DR. F. N. BEAM, Buffalo Center, Iowa.

On September 17th last, Mr. T. K. Single, laborer, born in Denmark twenty-eight years ago, came into my office to consult me as to what he could have done to his teeth. Upon examination I found that he was wearing a partial upper plate carrying the right central and lateral and one or two bicuspid. His molars and the left central and lateral were decayed to the gum, and had been in that condition for years so that but parts of the roots remained. The lower teeth were in about the same condition, those of the incisors remaining showing decay and the roots of the molars decayed to the bifurcation of the roots. Taking everything into consideration, I advised him to have all roots and teeth extracted, and full upper and lower dentures made. He agreed to this, but stated that when he was twelve years old he had had a tooth removed and that the socket had bled for three weeks. He said that had discouraged him from having any more extracted, but that probably he was in better physical condition now, and could have it done without difficulty. This was as much as I knew of the case when I extracted the roots, and the trouble he had had previously I attributed to the rupture of a small artery, which had been held open by a fracture of the process around the socket.

I made an appointment with him to come back that afternoon at two o'clock, which he did, when I extracted one root of the first molar on the right side, and waited for bleeding to stop, which occurred as promptly as usual. I then proceeded to remove the roots of the molars on each side of the upper jaw, waiting after each operation to see if there were to be any complications, but all bleeding ceased in less than five minutes.



**Hemorrhage
Several Hours
after Extraction.**

I then suggested that we remove no more till a later date, to which he agreed and he left the office, feeling as though he was to have no further trouble in having teeth extracted. I thought so, too, but the next morning, about ten, he came in the office and reported that at about nine P. M., some six or seven hours after the teeth were removed, bleeding began on both sides; that he tried to stop it by such means as he knew, but bleeding became more profuse right along till midnight, when he came to town and called up Dr. G. F. Dolmage, M.D., who checked it readily by packing with adrenalin tape. He went to his room in town, and went to bed, and was awakened about seven A. M. by his mouth filling up with blood. He tried to get Dr. Dolmage again, but could not and then came to me.

**Adrenalin
Chloride.**

I stopped the bleeding in about ten minutes with adrenalin chloride and cotton, and advised him to go back to his room and to bed. He left the office and was back in about thirty minutes, bleeding as freely as ever; said that when he stooped to pull off his shoes it started in again. It again yielded to the cotton saturated with adrenalin chloride packed in the sockets, and I told him to get one of his men to stay with him and to go to bed, and not to exert himself in any way. This he did, but in a few hours was bleeding again. We had him lie in a semi-recumbent position, with his head in an ice pack.

**Calcium Chloride
Potassium Iodine and
Thyroid Gland.**

We used all of the common styptics known, locally, and were giving internally calcium chloride 80-G, potassium iodide 30-G, and thyroid gland 15-G. each, daily, but we could control the hemorrhage for only a few hours at a time, when one side or the other or both would bleed as freely as ever.

**Diphtheria
Serum.**

We saw that we were not making any progress with that treatment, and on September 20th Dr. Dolmage administered diphtheria serum subcutaneously, without effect. On September 22d he was very weak from loss of blood, although the sockets were kept packed continuously with gauze saturated in adrenalin chloride. On this date Dr. Dolmage took his blood count, which was: Red 2110140, white 3600, hæmoglobin 20 per cent. His blood after standing one hour and one-half formed only a soft clot, the case was becoming more serious and Dr. Dolmage and I were giving it most of our time and study. We had tried every method known to both of us without any permanent result.

**Actual
Cautery.**

We then decided to use the actual cautery and under ether anesthesia we practically cauterized the sockets to a cinder before we could stop the bleeding. Finally we succeeded in doing so, not a drop of blood was showing and we thought that now we had it under control. He did not bleed any more until the eschar sloughed away from the tissues some forty-eight hours later, when bleeding began from the gum tissues surrounding the sockets. It was quite profuse and while I finally succeeded in stopping it on the right side with trichloroacetic acid cauterization, the same remedy would not stop it on the left side. There was no further bleeding from the sockets and at this time only from the gum tissue on the right side, but blood simply oozed through the tissues surrounding the sockets where the roots had been extracted and *slightly from around the central and lateral roots which had not been touched at all.* On September 28th Dr. Dolmage gave him 120 C.Cs. of diphtheria antitoxin, this time intravenously, with little reaction and no effect upon the hemorrhage.

On September 30th the patient was so weak from continuous loss of blood that he was unable to walk, his appearance was anemic in the extreme and he was losing his appetite which, up to this date, had been good and had helped to keep up his strength.

**Horse Blood
Serum.**

Dr. Dolmage then decided to try the virtues of pure fresh horse serum which, he stated, had been used successfully within the last year or two by some surgeon, to increase the power of the blood to clot. With the assistance of Dr. Kertz, D.V.S., a sound young three-year-old horse was selected, from which they extracted a quart of blood. It was then defibrinated and centrifuged and put on ice for twenty-four hours and on October 2d 120-C.Cs. of this serum was injected *intravenously* through the median basilic vein. The patient suffered much shock during the latter part of the injection. Hemorrhage stopped inside of five hours; temp. at that time was 101, pulse 120, resp. 22. Patient developed a severe urticaria over entire body twelve hours after injecting the serum; for fear of further hemorrhage 30-C.Cs. of the same serum was given in the same manner forty-eight hours after the first injection. Patient was kept in bed for one week longer, when he had regained sufficient strength to resume his work.

As all of the previous treatments we had used had failed we are forced to believe that the pure fresh horse serum was the remedy that stopped the hemorrhage and saved this patient's life.

**Family and Medical
History of Patient.**

The case being so unusual Dr. Dolmage secured the social, family and past medical history of this man, which I will record, as it shows that he is from a line of bleeders and has inherited his hæmophilia.



Social History: No alcoholic nor venereal history.

Family History: Father and mother alive and well, aged 66 and 62 respectively; two brothers, aged 34 and 35, alive and well. Two sisters, 29 and 31, alive and well; *no other bleeders in immediate family.*

Mother's brother died at age of twelve from hemorrhage from slight cut on face. One of mother's male cousins a bleeder. Mother's father a bleeder; several of the males on mother's side were bleeders several generations back.

Past medical history: Had had measles and mumps; severe hemorrhage at age of twelve, following extraction of one tooth; had been troubled with nose bleed during entire life.

The use of the actual cautery caused a sequestrum to form on the right side which sloughed out on or about October 24th; that is, it became loosened and he removed it himself without any hemorrhage at all; it was about one inch long and of varying thickness from about 2 m.m. to a feather edge. On October 26th he again came to my office suffering with an abscess on the only bicuspid he had left in the upper jaw; it was very loose and I was sorely tempted to extract it for two reasons, first to give him relief and secondly to see if the effects of the serum administered was still operative in aiding his blood to clot, but as I was able to establish drainage in the tooth which relieved his pain, I thought that it would not be wise to risk extraction.

Dr. Dolmage deserves all praise and credit for the successful treatment of this case, and as I was in such close touch with the case throughout, I give it publicity through ITEMS OF INTEREST, thinking that the treatment used might at some time, somewhere, be of use in cases of this kind, which are rare, fortunately for the dentists.

"Fright."

By DR. P. S. COLEMAN, Wilburton, Oklahoma.

I am located in a section of the country which is largely populated by foreigners, Poles and Italians. As a rule they very rarely undertake any extensive dental operations and extraction of offending molars is invariably resorted to. Practicing among them for some years I have naturally become acquainted with their present modes of living and have learned quite a deal of their history in the old country, where the men, being subject to army restrictions, have had some weird experiences at the hands of Italian army surgeons.

It appears that when one becomes afflicted with "toothache" he selects



several "holders" and presents himself for an extraction. As a natural result of this kind of proceeding it is very rarely that an Italian presents himself at my office in a natural frame of mind; he comes as a last resort.

Usually the newcomers are anemic, of weak constitution and very susceptible to the effects of cocaine. Fright, however, seems to be the main affliction. I recall one case in particular.

Some eighteen months ago a young Italian called for an extraction. Immediately after the injection of a one per cent. cocaine solution he developed alarming symptoms, finally becoming unconscious, in which condition he remained for nearly an hour, responding very feebly to hypodermic injections of strychnine and nitro-glycerine. While in this condition I extracted the tooth. Probably a year later he presented again. This time I used a solution of two per cent. novocain and the results were identical. I settled down to an hour's work reviving him, which was even more difficult than on the previous occasion, and at times the pulse and respiration were almost nil, death seeming very imminent. Previous to this extraction I had administered a large dose of alcohol. Three months ago, he again called for me to remove a small root which was very loose, and not especially painful. I had in mind the previous experiences which were not at all pleasant, and simply taking a piece of cotton saturated with iodine and aconite, rubbed the gum and removed the root. The patient seemed to experience no pain whatever and, as a matter of fact, all of the extractions were of the simplest nature, but he promptly fainted, and again with the most alarming symptoms. This time it was necessary for me to resort to hypodermics, artificial respiration and oxygen to effect a recovery at the expiration of two hours.

In this case my diagnosis is nothing more nor less than "fright" pure and simple. A close examination developed no heart trouble. In the use of cocain I have very seldom experienced trouble in extractions when pus is not present. In the use of conductive anesthesia of the lower jaw for the purpose of extraction I find one-third to two-thirds of one per cent. cocain solution effective and two per cent. novocain about upon a par. From the cocain solution, toxic effects have been noted in the ratio of about three per one hundred and the novocain toxic effects are practically nil. In most cases of intoxication, I find fear is responsible and is present in almost every case, and our efforts should be directed along the line of imparting confidence to the patient. Tell him you are not going to hurt and then keep your word.



Reflex Anesthesia.

By WILLIAM H. FITZGERALD, M.D., Hartford, Conn.

Read before the New Jersey State Dental Society, July, 1914.

In this paper I have attempted to condense my illustrated talks before the Connecticut and New Jersey State Dental Associations and shall only discuss that part of the subject that will most interest the dentist.

In zonatherapy we divide the body longitudinally into ten zones, five on each side and including the median line. The first, second, third, fourth and fifth zones begin in the toes and end in the thumbs and fingers or vice versa. The first zone extends from the great toe up the entire height of the body from front to back, across chest and back (Figs. 2 and 3) and down the arm into the thumb or vice versa. Pain in any part of the first zone may be treated and overcome temporarily, at least (and often permanently), by pressure over the first joint of great toe, or corresponding joint of the thumb. Should the pressure be limited to the upper surface of the great toe the anesthetic or analgesic effect will extend up the front of the body to fronto-parietal suture; also across chest and down the anterior surface of the first zone of arm and thumb and often the thumb side of index finger. (Fig. 2.) Should pressure be made on the under surface of the great toe the effect will extend along the first zone in the sole of the foot and up the back of leg, thigh, body and head in that zone to the above named suture; also across the back and down the posterior surface of the first zone of the arm and thumb, and often the thumb side of index finger. (Fig. 3.) Pressure on the end of the great toe or tip of the thumb will anesthetize the entire first zone. A limited amount of anesthesia may be established by pressure over any

Items of Interest

resistant bony surface in this zone, and often the mere momentary contact with the galvano-cautery will produce the same result. Pain anywhere in this zone may be overcome more quickly by pressure with applicator or with cautery contacts at certain points throughout the first zone in the mouth, pharynx, epi-pharynx and nose, but the finger and toe pressures may be relied upon very often and what applies to one zone, applies to all. Pressures average from one-half minute to four minutes depending upon the susceptibility of the patient. If for example your patient has pain in the first zone on the left side of the jaw (upper

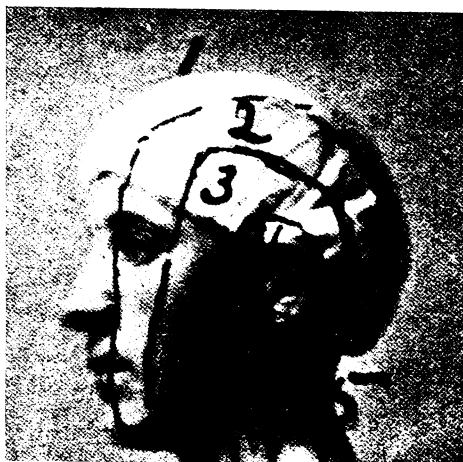


Fig. 1.

or lower) it is overcome, temporarily, at least, by firm pressure on the great toe or thumb. The patient may exert this pressure himself, but the operator or an assistant will do it more expeditiously. This pressure may have anesthetized the incisor region sufficiently for painless extraction of the incisor and cuspid teeth (left). However, it is usually necessary to supplement this pressure, for operative interference, by pressures on the lips and at various points on the jaws. The first, thumb or great toe, zone (left for instance) usually includes the left incisors and cuspid tooth. Occasionally the second zone includes the cuspid tooth. The second zone, as a rule, includes but the bicuspid teeth. The third zone includes the two molars and the inner side of the fourth zone, the wisdom tooth. Pressure with the thumb or index finger or cautery contacts on the upper or lower jaws in any of these zones will relieve pain in any part of an individual zone. Pressure or cautery contacts on the



Fig. 2.



Fig. 3.

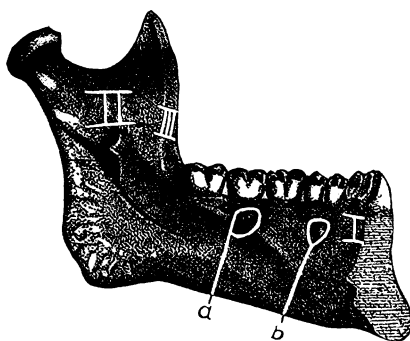


Fig. 4.

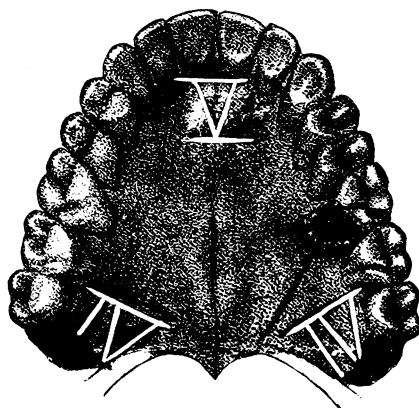


Fig. 5.



Items of Interest

anterior surface of jaws, control anterior sections of zones one, two, three, and four, and pressures or cauterizing contacts on the posterior surface of jaws control posterior sections of the above zones. Pressure with the thumb or finger on the inferior dental and lingual nerves at the inferior dental foramen will anesthetize that half of the jaw, and to a greater or less extent the entire half of the body on the side compressed, and because of the anastomosis of nerves at the median line of the jaw, this pressure occasionally causes an anesthesia of a part or even the whole of the opposite side of jaw, but this is the only instance thus far noticed where anesthesia, through pressure, crosses the median line of the head or body.

Theory of Zonatherapy.

We are repeatedly called upon for the theory of zonatherapy. Most theories are interesting, but not conclusive, and rather than be obliged to retract theories we will not attempt to advance them (except very superficially) at the expense of clinical facts, at least, not in this paper. It is possible that certain control centers in the medulla are stimulated, as has been suggested, but I believe that it is shock more often than stimulation. Some theorist has pointed out, perhaps rightly, "these functions may be carried out by the pituitary body through the multiple nerve paths from it."

We know that we induce a state of inhibitive anesthesia in the zone where pressure is brought to bear. We are certain that lymphatic relaxation follows pressure and the theory advanced by Dr. Bowers, "that inasmuch as there are admittedly ultra-microscopic bacteria, it is more than likely that in the light of this work there are ultra-microscopic connections analogous to those we call nerves."

Let the physician or the dentist who ascribes these phenomena to suggestion, attempt to relieve an aching incisor (left) by pressing the little finger of the left hand of his patient, for instance, or exercise his persuasive powers on a throbbing molar by pressing the thumb. He will find himself up against a stone wall so far as results are concerned, for only by exerting pressure on the proper zone will the pain disappear. Anticipating such contentions, we have purposely refrained, in hundreds of instances, from suggesting that we were even contemplating the relief of pain, and the first and only suggestions have been from the patient, for example: "Doctor, I certainly experienced much pain in the jaw, eye, small of back, knee, foot or shoulder, etc., before you pressed my fingers or used pressure in my mouth, but where has the pain gone? Have you done anything to relieve it?" etc., etc.

What concerns and interests you most, as dentists, is the possibility

of demonstrating on practically everyone of your patients the connection between the toes and fingers and the teeth. This establishes the incontrovertible fact that the medical and dental fraternities must work together if we are to accomplish all that it is possible to accomplish in combating disease, for it clearly demonstrates that foci of infection, however minute in the mouth, may be responsible for pathological changes

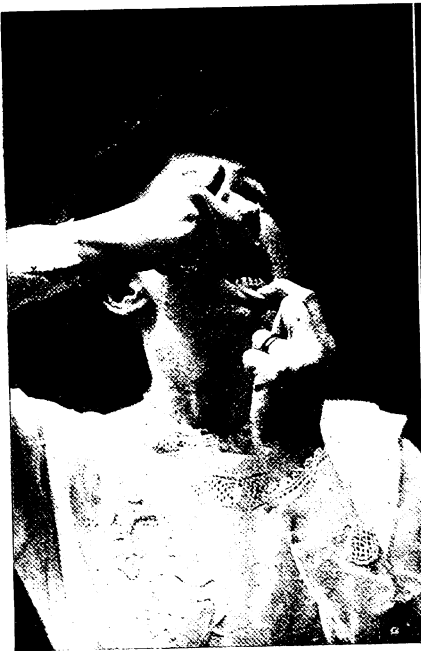


Fig. 6.

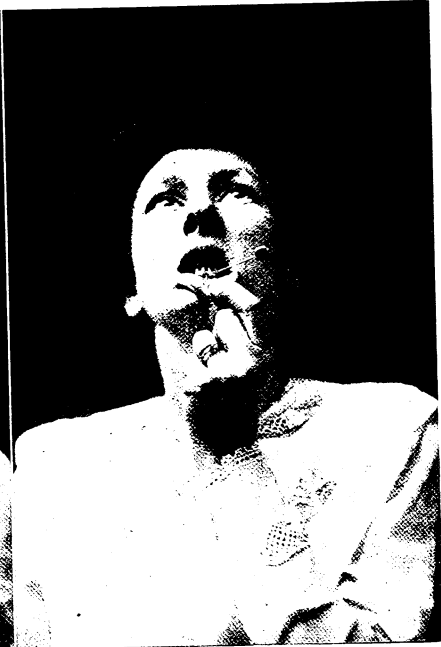


Fig. 7.

in practically every section of the body. Pathological conditions from mere irritation in the nose, epi-pharynx, pharynx, mouth, throat, vagina, rectum, etc., may be responsible for not only annoying local manifestation but obscure pathological changes in most remote sections of the body and their course can usually be traced through an individual zone. There is not an existing pathology condition that cannot, at least be relieved, and a large proportion can be cured through what we may some day call "shock anesthesia." We have never suggested this work as a panacea, but finding it helpful in the treatment of human ills we consider it an asset to our knowledge of medicine and surgery, and have been glad to offer it gratuitously to physicians and dentists to make whatever use they will of it in the practice of their professions.

Some Effects of which We Are Certain in Zonatherapy.

First: Analgesia may be produced in the majority of cases over all parts of the body, from pressures or cautery contacts in the mouth, pharynx, epi-pharynx and nose, and analgesia in a large percentage of cases over the entire body from pressure or cautery contacts on extremities.

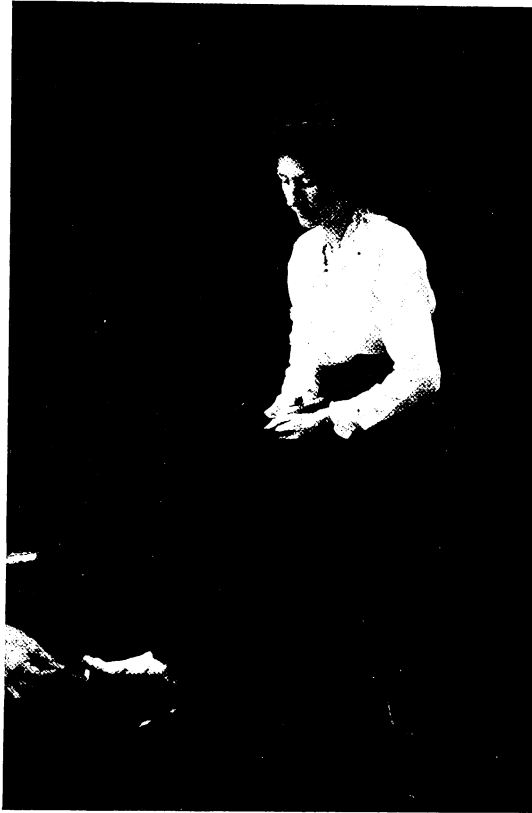


Fig. 8.

Second: Anesthesia of jaws may be produced in the majority of cases from direct pressure or cautery contacts on the jaws, and anesthesia of the jaws from pressure or contacts on extremities in a fair percentage of cases.

Many dentists have written me stating that they have been suc-

cessful in establishing anesthesia through pressure in at least fifty per cent. of their cases. Patience and perseverance and the observance of a few general instructions will enable them to improve their technique and their success will correspondingly increase.

Those who have not been successful, perhaps because of lack of perseverance, or who have not even attempted to anesthetize through pressure, being influenced and strengthened in their scepticism by in-

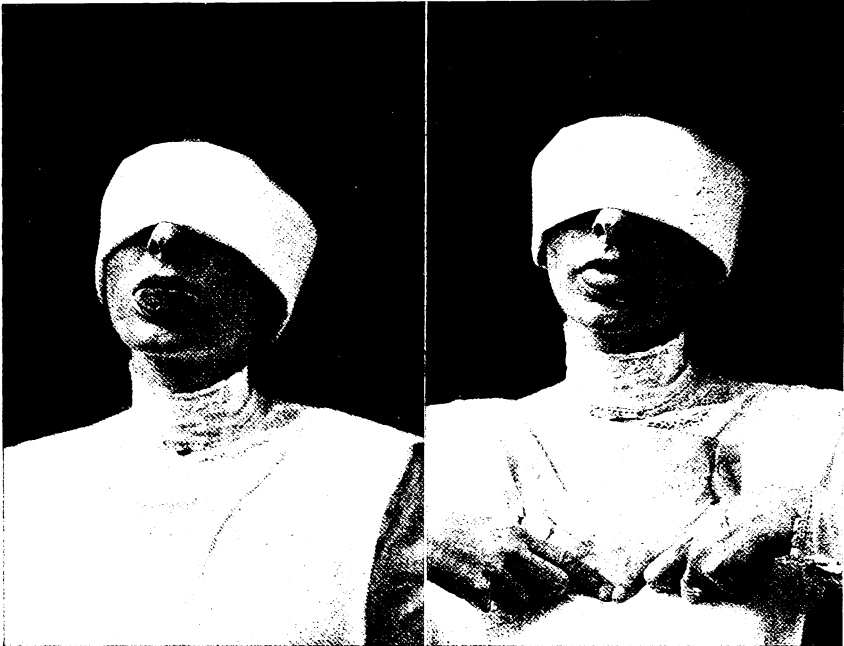


Fig. 9.

Fig. 10.

dividuals interested in the sale of apparatus for the administration of anesthetics, or others interested in some proprietary article of anesthetic persuasion, would better get to work and convince themselves that pressure anesthesia has come to stay.

There will be no soreness or lameness of jaws due to this form of anesthesia following operation, if instructions are followed.

Description of Illustrations.

Fig. 1.—Profile with individual zones in head.

Fig. 2.—Anterior view with zones outlined throughout face and extremities, left. Comparatively few patients are able to trace sensations

Items of Interest

or pressure throughout body, but on the other hand, pain in any part of the body in a large percentage of our patients seldom resists zona-therapy. These illustrations are approximately correct, but are subject to slight revision.

Fig. 3.—Posterior view illustrating individual zones. It will be ob-

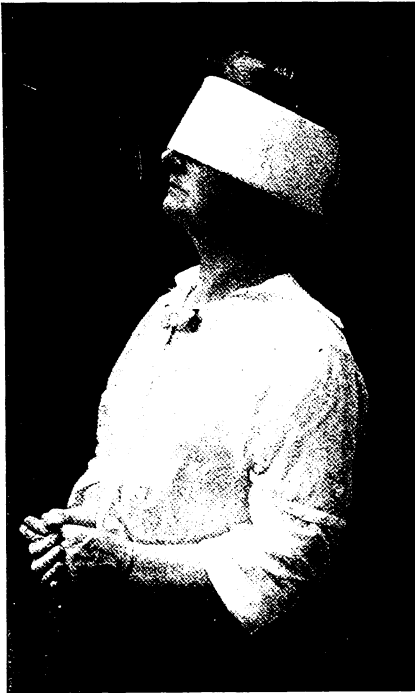


Fig. 11.



Fig. 12.

served that what is commonly called the back of the hand is really the front of that member, whereas the palm of the hand corresponds to the sole of foot.

Fig. 4.—Pressure at I, Fig. 4, with thumb and finger will anesthetize both thumb zones inasmuch as the pressure is brought directly on the median line and to the right and left of it. Pressure at II, Fig. 4 (pressure on inferior dental and lingual nerves) will anesthetize not only the entire jaw on the side compressed, but to a greater or less extent, the entire half of the body. Pressure at (a), Fig. 4, with thumb and finger (anterior and posterior) will often anesthetize that zone sufficiently for painless extraction. Any tooth for extraction may be prepared similarly. Cautery contacts at some points will often accomplish the same results,

that is on anterior and posterior surface and between the teeth. Pressure at (b), Fig. 4, with thumb and finger, anesthetizes bicuspid and occasionally molars. Pressure at III, Fig. 4, with thumb and finger, will aid materially in anesthetization.

Dr. B. A. Sears was the first to note that pressure on the ring finger anesthetized the wisdom tooth, and Dr. Charles H. Riggs, Dr. W. J. Hogan, and Dr. Geo. McLean, of Hartford, and Dr. James A. Lawton,



Fig. 13.



Fig. 14.

of Middletown, Conn., concur with him in this observation and all of the above named dentists say that occasionally they must look to the little finger for assistance in anesthetizing the wisdom teeth.

Fig. 5.—Pressure at IV, Fig. 5, will not only anesthetize the third and fourth zone, but oftentimes that half of upper jaw. Pressure at V, Fig. 5, with finger covering median line and a counter pressure with thumb on outside of jaw, or even on lip directly opposite finger, will usually anesthetize the incisors sufficiently for painless extractions and occasionally the entire jaw.

Fig. 6.—Patient is here anesthetizing the anterior surface of the jaws (left) in first zone, by firmly pressing the lip directly opposite, between



thumb and index finger of left hand, and indicating the area with right index finger.

Fig. 7.—Stickpin firmly imbedded in section of anesthetized area.

Fig. 8.—Lighted match held beneath patient's right, great toe. Anesthetized through pressure on inner surface of jaw in first zone.

Fig. 9.—Anterior quarter of tongue coated with tincture of iodine.

Fig. 10.—Four minutes after, complete absorption has taken place, and patient is indicating sensation of heat or reaction over several zones in chest where it is most pronounced. This reaction does, as a matter of fact, extend over entire body. It is easily demonstrated that the tongue, when firmly compressed by the teeth, will produce relaxations of the entire body, and in susceptible individuals a moderate amount of anesthesia of the entire body, for the mouth is also divided into ten zones. These illustrations point to possibilities of speedy absorption of toxins from the inner surface of neglected teeth and gums.

Figs. 11 and 12.—Profile and full face and neck of patient from New Hampshire, who consulted me April, 1, 1914, with well-marked bilateral goitre of two years' standing. Infection apparently from inflammatory process in first zone, left jaw. This was speedily overcome by Dr. W. J. Hogan. Patient had had constant pressure and frequently pain over sternum for three months. Patient responded quickly to distal pressures, and was agreeably surprised to learn, although at first unwilling to believe it, that the pain and pressure would disappear for hours after pressure, as depicted in illustrations. Twice daily patient exerted pressure on posterior wall of epi-pharynx, via nostrils, with cotton wound applicator moistened with spirits of camphor, the camphor for its antiseptic effect merely. Patient returned to New Hampshire the first of May, after one month of treatment, or fifteen visits, considerably benefited. The growth had entirely disappeared the middle of June.

Figs. 13 and 14.—The two last photographs were taken in Hartford, July 1st. Pressure through thumbs, index and middle fingers of both hands and posterior wall of epi-pharynx, which she continued at home, is the only treatment she received.

Oral Prophylaxis the Guardian of Health.

By JULES J. SARRAZIN, D.D.S., New Orleans.

Read before the Louisiana State Dental Society on June 4, 1914, and by invitation before the Mississippi State Dental Association on June 23, 1914.

History.

The patient's case was first diagnosed as malaria and later as typhoid. She had been confined to her bed for about three months. There had been a chill

one cold morning returning from a ball. Fever followed, which became intermittent in character; chills became periodical; all appetite and strength failed; she grew emaciated; cachectic eruptions appeared on the body. During the fall of the previous year a dentist had given her mouth many examinations on account of an impacted upper canine, which he finally had located by radiography, and which he successfully removed shortly before she became ill. The first physician who attended her made out the septicemia later, and diagnosed malignant endocarditis. Treatment thus directed afforded no relief. In fact, she was steadily losing vitality and resistance at the age of twenty-four.

Dr. Otto Lerch was called in. His usual thorough examination, the story of the case and its symptoms convinced him that the cause of the septicemia must be found. Yet there was no clear accounting for it. He listened to the impacted canine anecdote, and the fact that he is one of the few physicians who thoroughly appreciate the influence of mouth conditions on health made him suspicious at once that the exodontia, which had required burring and lacerating, might have resulted in a wound which had become a focus of infection.

I made a thorough examination of the mouth under the usual difficulties of attending patients in bed, this time increased by the fact that the patient could not bear sufficient light in her room and lacked enough strength to maintain her jaws apart long enough to allow convenient probing. The exodontic wound had thoroughly healed, but slightly congested and tumefied gum margins reflected themselves in my mirror at the same time, while the remaining mucosa were anemic. The patient needing rest before she might again open her jaws, I kneeled on the floor to take the next opportunity to probe sockets around roots, but I felt quite sure that I was getting at the etiology of the case, and my posture was of no moment. I convinced the patient to allow more light in her room while she protected her eyes with a handkerchief, and each socket probing revealed advanced Riggs' disease, without wobbly teeth, and brought unmistakable traces of pus. The disease, although worse in some quarters than in others, was general throughout the mouth. It must have had its initial stages at least eighteen months before, if not sooner. Early stages usually go unrecognized. Dentists never fail to diagnose Riggs' disease when teeth wobble from a gust of air, and when only a few may still be saved. Strong systemic resistance saves the health of the robust patient, or it may be but slightly impaired, due to a constantly high opsonism. Between these two extremes we see manifested all grades of resistance and collapse. This girl was of a frail type. She had kept irregular and late hours throughout the carnival season. The already infected blood current had predisposed the nervous system to

the chill felt in the early morning of that cold night returning from a ball. Office surgical treatment and proper home mouth hygiene, practiced in time, would have prevented the dire developments, but their necessity had not been diagnosed in the incipient and early stages of Riggs' disease. The majority of dentists do not realize that the slightest venous congestion of the oral mucosa or tumefaction of gingival margins anywhere in the mouth, approximally or at a tooth neck, means danger; when not already a separation of subjacent peridental membranes, there may be some frosty infectious deposits, decomposing serum, staphylococci and streptococci at least.

Thus the patient had been confined to her bed. The infection had been allowed to vitiate the blood current in the cancellous tissues of the jaws, while ingesta spread it through the alimentary canal for absorption into the general circulation, and she lacked the phagocytes and leukocytes necessary to wage a successful battle for her health.

Treatment.

Surgical treatment was out of the question for the present. It might be started later, as soon as the patient convalesced. Dr. Lerch directed his treatment to fortify the patient, while I prescribed, to be used four times a day and twice during the night: Vident polishing tape rubbed between the teeth, against each one; a mouth wash containing tannin, iodine, and potassium iodide; a narrow Vident brush, to allow convenient universal reach; Vident No. 4 Riggs' disease powder;* and a Vident tongue cleanser three times in twenty-four hours. I impressed the trained nurse with the enormous importance of reducing the quantity of oral septic material so that less of it would stagnate in sockets and enter the alimentary canal. My lady assistant showed the trained nurse how to effectively apply the above articles, how to stimulate gum circulation with brush bristles, and how to massage gingival tissues so as to help the return of venous blood to the heart.

How little sick nurses know about the care of the mouths of their patients and concerning its necessity, especially following some surgical operation on digestive organs, is appalling. With many nurses it is very

*Vident No. 4 Riggs' Disease Powder:	
Cuttlebone (inside spongy portion only, pulverized to No. 120 fineness) ..	3IV
Pumice (No. 120 fine)	3VIII
Soda Bicarb.	
Sodium Chlorid	aa 3III
Acid Benzoic	3III
Boric Acid.	
Zinc Sulphate	aa 3IV
Thymol.	
Carbolic Acid.	
Eucalyptol	aa gr. V
Flavor q.s.	

difficult to have them follow such instructions, even in part, because they do not realize their importance and lack the desire to increase their own work. Their usual plan is to swab out the mouth when the patient asks for that service! How about the patient whose condition is aggravated by oral sepsis, and who really requires much more than a perfunctory half-strength H_2O_2 wet cotton wiping? Frequently when a patient under Riggs' disease treatment, who may have passed and recovered from the surgical stage, but still requires a close and careful maintenance of the prophylactic, must undergo some surgical operation, or may become ill, my lady assistant and I take special pains to train the sick nurse in charge of the case. The patient knows the importance of mouth hygiene and would readily submit to it, but the nurse usually neglects or omits it, with a result of actual damage, and a setback showing in the mouth, to say nothing of the ingesta which will have delayed the patient's recovery, and actually endanger it, when the surgical interference was in the alimentary tract.

The fundamental trouble is that few dentists teach proper mouth hygiene and its importance to all their patients, or else nurses would learn it somewhat; the next is that physicians, with a few exceptions, do not insist on the maintenance by nurses of favorable mouth conditions, because even they do not realize their full importance. Of course, mouth treatment for the sick room must be adapted from the usual home prophylaxis, with some modifications to suit conditions and to make it acceptable to the patient without compromising results. In fact, patients become grateful for the mouth comfort given them, and will readily submit to it; those accustomed to its proper practice during health will ask for it, to be told by the nurse, in some instances, that she dislikes taking care of the mouth, and that it is not her special business.

Fortunately, the trained nurse in the case of septicemia under consideration was one of more than ordinary intelligence, who realized that since we depended on frequency of topical applications to dissolve pus with tannin, while iodine and the potassium iodid exerted their germicidal and alterative actions, this treatment and its adjunct measures must be scrupulously enforced. She did so conscientiously.

Improvement in the patient's general condition began showing in the next forty-eight hours. Gradually, intervals grew between the periodic high fever spells, while more and more favorable symptoms developed, even to a reduction of the anorexia.

Dr. Otto Lerch had been delaying the start for his European vacation. Dr. A. E. Fossier, his associate, knew all details in the case, and had also been attending it since the beginning. The patient's condition continued to improve steadily, but it was to be expected that it would be a



long and slow journey from an alarmingly dangerous condition to convalescence. However, the march in that direction was steady and seemed assured.

On my return, after attending the Kansas City meeting of the National Dental Association, my first office inquiry was about the young lady patient's condition. It was met by a funeral notice. I was dumb-founded. Getting into communication with Dr. Fossier I learned that just as I left New Orleans, a previous engagement had called away the nurse on whom we depended. Another medical nurse was called in to replace her. She was told of the training which had been given the first one by myself and my lady assistant; of our explanations, demonstrations and reasons for thoroughness in the mouth treatment. Such transmissions of responsibility lack impressiveness enough to cause them to be thoroughly realized, even when they are conscientiously accepted and discharged. How much unintentional fault there may have been in any one of these factors remains a mystery. The crisis of the battle was on. The patient continued to improve by discouragingly slow strides. The question was how much longer the advantage could be kept on the side of phagocytes and leucocytes. Dr. Fossier, fearing that the mouth infection was not being reduced as well as previously, inquired into the matter, to be told that the patient's weakness did not always allow carrying out the full program. His perfect knowledge and realization of conditions made him remonstrate, of course.

Meanwhile, the proportion of infectious organisms had been increasing, because their source of supply had grown. As long as measures had been effectively enforced to reduce the volume of mouth infection, the protective phagocytes and leukocytes had been in sufficient quantities to overpower and destroy the invading streptococci and staphylococci, constantly reducing their numbers in the blood, giving rise to a slow improvement, which was maintained for some time after thorough mouth treatment failed, because the defenders had by that time increased in sufficient hordes to repel and conquer a larger number of invaders. But when the multitude of the latter became overpowering, all the resisting force had been exhausted; the cerebrum and then the cerebellum succumbed; death came almost suddenly. Its certificate was signed by Dr. Fossier for pyorrhea alveolaris as the *primary* cause of death.

Robust constitutions are not exempt from fatal terminations caused by oral sepsis. The difference consists in a much longer period of resistance during which the etiology of the systemic disturbances is so clouded that a diversity of chronic organic lesions are diagnosed until the final crisis is reached, at which time some more or less hypothetical cause is ascribed for death, without any realization of the fact that con-

stantly increasing septicemia has been its determining factor. Usually the etiology of the case has been clear at no stage of it.

**Case from
Practice.**

Some ten years ago the mouth of a robust fellow of thirty years showed me a clear Riggs' disease condition. No teeth were wabbly, but many lacked normal firmness, and shallow proximal pockets could be detected on roots here and there. I warned, and treatment was started, but the patient's cerebro-spinal system was already affected both by septic ingesta and by frequent doses of alcohol, which he constantly repeated, because he was the owner of a barroom. He found it preferable to avoid a treatment, which to him was a nervous strain and seemed severe, although, comparatively, it was not, due to the fact that his case was just somewhat passed the incipient stage. A couple of years later he was back, brought by constant discomfort and occasional pain, the origin of which was in the root sockets. There were large pus pockets. Some roots were drifting out of normal position. A few molars were loose, but not yet shaky. He had developed Bright's disease, severe arthritis, migraines and occasional dizziness, unaccompanied by costiveness. He was more nervous than ever. Plainly the cerebrum was becoming involved. He was under the care of one of our leading physicians, who, however, did not attach the importance I did to the mouth condition. I tried my best to make the patient realize developments to be expected; it was made clear to him that if he would save both his health and his teeth he must now submit to protracted severe treatment and effect half of the cure by his own efforts, or else he might better at once lose most of his teeth and save his health. The only hopeful feature was that he had sold his barroom, used no more alcohol, and was under a proper Bright's kidney diet.

This time he entered treatment, promising to submit to it and carry it out to a successful issue. In a few weeks his loose and uncomfortable molars had improved. He missed one appointment, and then another, and finally stopped coming, just when a good start at changing mouth conditions had been made. I was well acquainted with him, and whenever meeting him seldom failed to repeat my warnings. From time to time he returned for the removal of one tooth or another which troubled him too greatly, but never to submit to proper treatment. He had become practically rid of Bright's disease, showing the possibilities of a strong constitution even under such adverse hygienic circumstances. But in the course of a few years he began to break down. His occasional dizziness, which never had ceased, increased. The digestive apparatus failed. Bright's disease recurred, with frequent arthritis of the legs. He just lived through alternate spells of illness and comparative invalidism.



When a patient commits suicide by resisting correct advice, he usually blames results on everyone except himself. He followed the rule, and changed physician. Three years ago an original diagnosis of malaria was changed to typhoid, and later to cerebro-spinal meningitis. All along the odor from his mouth had been such that it was difficult to stand near his bed. The nurse had attempted the classical swabbing with half-strength H_2O_2 , but his mouth was so painful that he had resisted, even though he had most of the time been in a semi-comatose condition, and seldom conscious. At times he fought to get out of bed. What is clear is that septicemia had at last affected the cerebellum. The certificate gave "infectious malaria" as the cause of death. Some form of infection was realized somewhat late.

The first fatal case related is typical of septic systemic developments where a frail constitution lacks resistance to infection. The second portrays a strong constitution collapsing under a double morbid assault, after having clearly shown its ability to mend if not deprived of adequate aid; while a resisting organization of a class intermediate between the two already pictured would, without the maintenance of proper treatment brought to a successful issue, break down under the single infection of purulent root sockets, with periods of high and low resistance, until a fatal termination develops at the end of the usual varied and contradictory medical diagnoses, always because the fundamental etiology is not suspected.

It would not help the scope of this article, else I could indulge in the relation of more cases of oral sepsis with fatal terminations, observed during a period of fifteen years, since my eyes have opened to them.

Third Case from Practice.

A case belonging to the class of single etiology and strong resistance presses itself so vividly forward as I write that I will relate it briefly. However, to make its narration really useful, let it be taken as typical of the march of the effects of systemic infection on the nervous centres, which other cases also illustrate. When other organic lesions complicate the morbid picture, there may be seeming temporary modifications, but the fundamental march remains clear in the background: The cerebro-spinal system is first involved, then the cerebrum, and finally the cerebellum. The factors of resistance and of single or complicated etiology determine whether this march is completed in a few months, or in a number of years. Therefore, I relate a last case simply as a final illustration:

Married woman, aged thirty-six years, became nervous and unusually irritable; robust, no organic trouble of any kind, perfect teeth, but shortly afterwards roots were drifting and pus was in sockets. All

functions good. First symptom of septicemia was articular arthritis. Headaches gradually growing in frequency and intensity. No constipation. Proper mouth treatment never instituted, because neither her physicians nor her husband realized its proper character and necessity. Two years later gastritis began the collapse. Increased headaches; dizziness which resulted in a fall. Due to strong resistance, the first spell of delirious fever did not occur until a couple of years later, from which she rallied and remained a comparative invalid. Diagnosis had varied from cerebral congestion to a blood clot, and in the next two years another spell of fever closed the drama, during the last act of which the odor from the mouth had been unbearable. A portion of the time the diagnosis was a tumor, and at the end it changed to abscess in the brain. The septic and primary cause of disease was recognized in death.

Owing to unusually great systemic resistance to infection, or to alveolar conditions and socket developments which rapidly shed out diseased roots, or force their extraction, the majority of Riggs' disease patients become edentulous in time to escape loss of health. Knowing only their own experience of discomfort with natural organs and ease with prosthetic ones, they unintentionally mislead their closest and dearest fellow-beings with the statement that they are better off with their artificial dentures than ever they were with their natural teeth, quite ignorant of the fact that their chewing power has been reduced five-sixths, and that it is always a question how long digestive and assimilative functions can supply the increased work required of them before some dangerous lack of equilibrium develops.

**Riggs' Disease
Preventable.**

The saddest part of it all is that Riggs' disease is preventable. Nature's plan is the frequent, vigorous mastication of hard, fibrous, raw, vegetable or animal material, coupled with constant active exercise in the open air, often interrupted by periods of rest in a horizontal position. Details studied out from these facts and their fundamental physiology and prophylaxis would require an article as long as this one already is.

Mind supplies the artificial substitutes for local prevention. They consist in the proper brush and proper polishing on oral hard tissues, supplemented by polishing tapes on approximal surfaces; all being started in childhood, repeated at proper times to prevent any fermentation and the formation of any deposits anywhere at gum margins, with the proper motion of bristles to stimulate blood circulation without injuring either hard or soft tissues. This, started in early life, and thereafter permanently maintained, constitutes practically absolute local prevention. Home



prophylaxis which is not scientifically thorough is not absolutely reliable, and it becomes the *guardian of health* in a measure only, but always in a most generous measure. Here again pages upon pages could be written.

The fundamental prophylaxis applying to the systemic background, and hinted at in Nature's plan, can never be disregarded, whether from childhood up, or when Riggs' disease shows its incipient symptoms, or its advanced stages. That plan guides and teaches the reliable therapy to apply. We could pause here again to consider a multitude of details to follow out. It is idle to stimulate surface capillaries with bristles unless the pump is helped to rhythmically and powerfully fill underlying pipes with blood of improved quality, to dislodge venous congestion and destroy infection.

It is incipient Riggs' disease conditions which we must learn to recognize early if we would protect our fellow-beings against disease, and in some cases against death. This is the stage at which the battle can be fought with assured victory and with the least effort on the part of the operator and patient. Later the field is strewn with lost limbs.

Oral sepsis begins coincidentally with habitual or frequent fermentation, and the danger signal is there.

Facilitate home prophylaxis to patients, make it less irksome and more reliable by properly proportioned and properly shaped utensils to be used in conjunction with scientifically efficient mouth preparations. Teach them *how*, *when* and *why*, and in direct proportion as we truly help, we require more and better co-operation, and we expect and obtain better results.

Office prophylaxis and Riggs' disease surgical treatment fail without proper, faithful home prophylaxis performed with the help of reliable therapeutic adjuncts. This would add another chapter; but the strongest *guardian of health* is found at home, both locally and systemically.

Nothing better was ever done for humanity than the institution of school mouth hygiene, but if we would advance the cause of health and happiness, and hasten that millennium, we must also include adults.



Copper Cement Chemistry.

By W. S. MEDELL, B.Sc.

Read before the Lehigh Valley Dental Society, at its fall meeting, Mauch Chunk, Pa., September, 21, 1914.

"The vagueness and mystery surrounding the products which the dentist uses often enhanced by most confusing advertising gymnastics, are not a tempting barrier, with ever so fruitful a field behind it. It is a mistake, in my opinion, from both scientific and commercial standpoint, to withhold enlightenment, and it is equally difficult to conceive any but good results by closer communion between dentist and manufacturer."

This paper is opened with the above paragraph, quoted from a paper on the chemistry of oxyphosphates read before the Colorado State Dental Society in June, 1902, and published in *ITEMS OF INTEREST*. It fits the present situation of the copper cement question like a glove. The object of this paper is to lay the cards on the table face up, so as to give the dental profession an opportunity to judge the situation in the light of full knowledge.

You have no doubt read many advertisements on copper cement in which this statement or its equivalent appears: "In order to clear the situation we give the following information." Upon reading the advertisement you have obtained about as much real satisfaction as did the old negro who was sleeping beside the fire while the 'possum was cooking. His young grandson came in and proceeded to eat the meal the old man was dreaming about. After disposing of everything in sight the youngster placed the bones and remnants on the table by his grandfather's side, rubbed grease on his mouth and fingers and departed. Presently the old man awakened, and remembering the joys in store proceeded to business. He at once discovered the state of affairs. He looked at the bones, examined his fingers, licked his lips and exclaimed, "'Fore de Lord, I done forgot I ate him."

Ames's Copper Cement.

Dr. Ames was the first to introduce copper cement, and all other black copper cements are imitations of his product. I am sure there is not one exact reproduction on the market. Copper cements containing about twenty-five per cent. black oxide of copper were introduced a number of years ago in imitation of Ames. They were and are inferior to the original in many respects. The copper oxide content is not properly made.

Red Copper Cement.

About ten years ago Dr. Fleck introduced red copper cement, this being the first one other than black. Its use finally resulted, less than a year ago, in an imitation being placed on the market



by a prominent cement manufacturer, who at the same time introduced what is called "white copper" cement. Since then another manufacturer brought out so-called copper cements in all the colors of the rainbow. So much for the history of introduction of this class of oxyphosphates and their imitations.

Dental Cements.

Dental cement and oxyphosphate cement are synonymous terms, because there is not a dental cement of any value whatever which is not an oxyphosphate. Crown and bridge, inlay, temporary, filling, silicate and copper cements are all oxyphosphates. They are all of the same general form, which is an oxide powder and a phosphoric acid liquid. Therefore oxyphosphate of copper must have its copper content in the form of oxide, otherwise it is not a copper cement. That is one in which the copper present has true cementing action. Such a cement can be only one of two colors, black or red, because Nature provides but two oxides of copper, cupric oxide, which is black, and cuprous oxide, which is red. To call any cement a copper cement simply because it has a small percentage of some copper salt in the powder or the liquid is a misrepresentation. The manufacturer of such an article is sailing under false colors. If his product had "all the characteristics of the black copper, except appearance," and was "the result of years of investigation of the copper cement question by real scientists," he would be more than glad to call it by its right name and distinguish it from all inferior grades. He would surely not state in the same advertisement which extolled its virtues that the black would continue to be used "where the color is not objectionable and a pronounced preservative effect is desired," and with the next breath, add: "The formula (of white copper cement) calls for a minimum of copper to give the full sedative and bacteriological effect."

Red Copper Cement.

It is true that red is less objectionable than black as to color, but the main advantage is that it does not discolor tooth structure. At the same time it has all the cementing, antiseptic, sedative and preservative value of the black, because it is of the same type of construction. Therefore, there is no object in producing a red copper cement unless cuprous oxide is used wholly or in part. The imitation, mentioned above, is simply zinc oxide cement containing a small percentage of some copper salt, and does not owe its color to the presence of cuprous oxide, but to some other coloring material; probably iron oxide, which has no value except its coloring power. Red oxide of copper when burned in the air is changed to black oxide. All that is necessary to prove the truth of

the above is to burn some of this cement. It will not turn black. The original red copper cement powder does turn black on being burned. Any chemist will bear witness to the truth of the above statement.

The manufacturer introducing the Joseph's coat color scheme is the only one who makes any attempt to prove the germicidal properties of his product. He publishes a letter from the man who did the work, which describes the method used in testing, and says: "Three other brands of copper cement were tested in the same manner." Just why he makes this statement is hard to discover, because he fails to give any results by which to make comparison. He probably omitted these results for very good reasons. The letter further states: "During this work another advantageous property of your cement was noted, in that there was almost no diffusion into the surrounding media of the soluble copper salts, which might be both poisonous and irritating."

This statement most surely discloses the writer's lack of knowledge in regard to the subject. It is a well-known fact, demonstrated by years of dental practice, that true copper cements, even when containing over ninety per cent. of copper oxide in the powder, are decidedly non-poisonous and far from being irritating, nay, are markedly sedative in their action. Furthermore, the above tests were completed in two days. What guarantee can they give that the cement will retain its germicidal properties indefinitely?

A dentist, who is a personal friend of the manufacturer, reports as follows: "For more than a year I have been testing this material in every conceivable way . . . and the only point I felt was not yet settled by these tests was that of its germicidal property, and my report to you has been delayed on this account. I have felt that sufficient time had not elapsed to determine this point from mouth tests. Now, however, since the report sent me (the one referred to above) is so conclusive as to definite germicidal action, I feel that this point should be considered settled." His personal friendship is quite evident when he is willing to substitute a two-day test for lack of results in his own experience of "more than a year, . . . testing . . . in every conceivable way."

**Black Copper
Cement.**

The manufacturer of the original black copper cement has carried on a campaign of advertising claiming that a copper cement which is a combination of zinc and copper will have no value imparted by its copper content, even though it be an oxide, unless there is present practically one hundred per cent. of such oxide. The advertisements put out in this campaign were confined to *claims* up to a month or two ago, when reference was made to an article by Dr. W. V-B. Ames in the following words: "We invite the checking up of the work of Dr.



Ames, published in the *Dental Review*, June, 1914, by any 'Institute of Industrial Research,' or any scientific individual." After reading the article in question I decided to accept the invitation on the grounds that I am a "scientific individual," whatever that means. Not being a bacteriologist, I shall confine myself to a discussion of the chemical side of the paper. On pages 4 and 5 of the reprint of the article the following statements appear:

"Most important of all, from the standpoint of proper understanding of what may be expected from admixture of cement-making oxides, is the information gained by . . . analyzing the soluble salt produced and available for analysis in the fresh cement.

"Chemically . . . , it happens that the salt formed during the mix is at the expense of the zinc oxide, which fact forthwith removes all chance of discussion. Copper oxide, properly added to a zinc oxide cement, will give added integrity of mass

"The blending of zinc and copper oxides and then subjecting the mixture to the action of an acid phosphate solution is analogous to placing sheets of metallic copper and zinc in an acid solution to constitute the galvanic battery. In such a battery the solution of metal is entirely at the expense of the zinc, just as in this cement all salt formed is at the expense of the zinc oxide, except when nearly 100 per cent. oxide is contained.

"With mixed oxides the copper salts formed after setting will be less in proportion to zinc salts than the relative proportion of copper oxide to zinc oxide in the mixture, or entirely absent. . . .

"It is easy to demonstrate that there is nothing else than the zinc salt formed, in such a zinc copper mixture unless the copper content reaches so close to 100 per cent. that there is no argument in favor of the zinc oxide admixture. Chemical analysis of solutions obtained by puddling freshly mixed cement in water, easily shows evidence that metallic oxides obey the same law which governs the corresponding metals in entering into combinations. Metallic oxides, like the corresponding metals, obey the rule of electro-chemical potentiality in entering into combinations. The oxides interesting to us as cement ingredients occupy relations as follows, starting with the most positive, *i. e.*, zinc, iron, cobalt, copper, mercury; the zinc being positive to iron, the iron to cobalt, the cobalt to copper, and copper to mercury, each metal or its oxide being dissolved when subjected to acid in the presence of one to which it is positive.

"Chemical analysis will show that there is no copper salt formed when either cobalt, iron or zinc oxides are mixed with copper oxide, unless the copper predominates to the extent of nearly 100 per cent."

**Tests by
the Author.**

Demonstration is better than explanation. Therefore, I will perform a few experiments in checking the above statement. First, consider analyzing the soluble salt formed in the fresh cement and the claim that in a mixture of zinc and copper cement-making oxides the salt formed during the mix is at the expense of the zinc, and that no copper salt is produced unless nearly 100 per cent. of copper oxide is present. Take the five cements before us. No. 1 is so-called "white copper," No. 2 is the light shade out of the rainbow, No. 3 is black copper made in imitation of Ames and is supposed to contain 25 per cent. black oxide and 75 per cent. zinc cement; No. 4 contains 25 per cent. black oxide and 75 per cent. zinc cement; and No. 5 is red copper containing 25 per cent. red oxide and 75 per cent. zinc cement. A mix of each one is made and puddled with water and allowed to stand for a time, as you see, then filtered and ammonium hydrate added in excess to the filtrate. We have no characteristic blue shade in No. 1 or No. 2; all the others, which are of the mixed copper-zinc type, do show the blue. This is contrary to the article quoted. It is here demonstrated that soluble copper salt *is* formed even where the copper oxide content is much less than the zinc, and none where copper salts are used in the place of oxides.

It is also stated that the addition of copper oxide to a zinc cement improves its structure; also that the copper salts formed after setting are less in proportion to zinc salts than the original proportion of copper to zinc. This, taken in connection with the other statements, clearly indicates that the author of the paper reasons that no acid phosphates of copper are formed under the conditions mentioned, but that oxyphosphate of copper is finally formed. It can be demonstrated to the satisfaction of any chemist that the reaction involved between powder and liquid in all oxyphosphate cements proceeds in the following manner:

The first additions of powder form acid phosphates, which are soluble; as more and more powder is added saturated phosphates are formed, the same being insoluble; and finally, when the last quantities of powder are added, excess oxide is present and we have the oxyphosphate. Then if no soluble acid phosphates are formed at first there will be no oxyphosphates formed after setting has taken place, because the nearly neutralized acid present, after setting, will not react under conditions which prevented the action of the unneutralized acid in the first place.

Again: "Chemical analysis shows that metallic oxides obey the same law which governs the corresponding metals in entering into combinations." Take some metallic copper, add to it some dilute phosphoric acid and boil. What happens? As far as chemical reaction is concerned, nothing. The metal does not go into solution. On the other hand, take



some copper oxide, treat it in the same way with phosphoric acid. Solution takes place. Not only does solution take place, but it takes place very quickly. Take some red oxide of copper, treat it like the black. Now we see a change; the color is darker and on filtering we find there is copper in solution. What has happened? Simply this: In cuprous oxide there are two atoms of copper; when treated with phosphoric acid these two atoms react on each other; one is oxidized to the cupric state, the other is reduced to the metallic state. The first goes into solution as cupric acid phosphate, the second remains behind as insoluble metallic copper, and we have the proof, in one and the same reaction, that oxides do not enter into combination in the same manner as the corresponding metals.

In regard to one metal or its oxide being dissolved in acid in the presence of one to which it is positive, let us see. To a mixture of zinc and copper filings, 75 per cent. of the first and 25 per cent. of the second; add some dilute nitric acid, then an excess of ammonium hydrate. Copper is in the solution. To an alloy of zinc, between 85 per cent. to 90 per cent., and the balance copper, add some dilute nitric acid, then ammonium hydrate. Copper again in solution. In the list of metals which interest us as cement ingredients, aluminum is not mentioned. Why? For the following very good reasons: Into an acidulated solution of copper drop some metallic aluminum, boil and observe that all the copper is deposited. Pour off the liquid, wash with water, add dilute nitric acid and observe that the copper goes into solution, the aluminum does not.

Lastly, he states that in mixtures of iron and copper oxides there is no copper salt formed unless the copper predominates to the extent of nearly 100 per cent. Take a mixture of iron oxide 75 per cent. and copper oxide 25 per cent. Boil with nitric acid, filter and add ammonium hydrate. Large quantities of copper prove to be present and very little, if any, iron.*

*All chemical experiments mentioned in the above paper were performed by its author before the Lehigh Valley Dental Society on the day it was read, thus demonstrating the scientific exactness of the statements made.—J. C. HERTZ, Chairman of Committee.



The Greatest Problem of the Day in Dentistry.

Grieves, Hartzel, and other research workers and sound thinkers in our profession, are declaring that arthritis, cardiac lesions, and other dreaded diseases may often be directly traced to the septic roots of improperly filled teeth. Indeed, the dangers from septic conditions about and around the teeth have been described and printed in so many dental and medical periodicals, and evidence as to the correctness of the statements has been so convincing that no one has the temerity to deny that an improperly filled root canal may become the direct cause of invalidism and even of death.

Once the layman fully grasps this, and stops to contemplate the menace to his health that poor dentistry may engender, will it be long before he begins malpractice suits against his dentist if he goes lame in his great toe after having a front tooth filled? But how is the layman to become informed, you ask?

By his doctor! The layman accepts anything that his doctor tells him, so long as he has faith; when he loses faith he gets him another doctor and then believes what that one says. But what does the doctor know? Little enough! Altogether too little in view of the seriousness of the situation.

An Experience.

The following is a true narration of an actual incident, and carries a moral; two morals, in fact:

A well-known dentist called on the writer re-



cently for an opinion as to the reading of several radiographs. The subject had an attack of rheumatism and visited her family doctor. The doctor, having read his journals, immediately suspected the teeth, and forthwith sent the woman to a radiographer; a medical radiographer. Upon receiving the films the doctor informed the woman that almost every molar and bicuspid in her mouth suffered from a blind abscess, and that until these were cured he could do nothing for her. Hence the visit of the patient to her dentist, and as a sequence his request for assistance and advice from a brother dentist.

A careful scrutiny of all the films showed first that they were not well taken, and that the depth of shadows were consequently not thoroughly reliable. Some one must have informed the doctor that a dental abscess shows dark in the films; therefore, every little dark speck in the film loomed large as an abscess to this medical mind. The first moral, then, is embodied in the rather old adage, that "a little knowledge is a dangerous thing," even for a physician. Further study of the films showed that of nine or ten suspected teeth, all but three enjoyed living pulps and sound health.

But! The other three teeth all had abscesses, and were teeth which had been filled by the dentist himself. The root fillings were imperfect, especially so since one of the root canal pastes had been used. The second and more important moral is that dentists must learn to properly fill roots, or else very shortly be prepared to be held responsible by patient and doctor for all manner of body ills when a radiograph can be produced that proves that his root work was imperfectly done.

**What the
Radiographer
Cells us.**

But the radiographers tell us that over seventy-five per cent. of the canals of multirooted teeth, and at least fifty per cent. of single-rooted teeth, show imperfect root canal fillings when tested with the X-ray. A number of our most careful and skillful dentists have proven that root canals can be properly treated and properly filled if the proper technique be employed, which includes at least two and often more radiographs to check up the progress and completion of the work.

With the adequate method constantly described in the literature, and

with radiographic proof that his work was imperfect, what chance will the dentist have before a jury in a malpractice suit, when the medical man will testify, "This patient is crippled with arthritis for life, and the infection came from these imperfectly filled roots. Had they been correctly filled, or had they been extracted, the patient would be a well man to-day."

Of course, the answer to all this is that if men do not know how to fill root canals properly, they must learn. The skill must be acquired for their own safety and for the benefit of the health of the community.

One just arrives at this deduction when some one rises on the floor in a discussion of this subject and asks this question of the essayist:

**How Shall
we Treat
Poor Patients.**

"You tell us that a tooth should better be extracted than to be left in the mouth with the root imperfectly filled. Suppose you had a practice among the poor. Suppose that a pretty young woman should come in, and you should find a dead pulp in a central incisor, not yet discolored. She tells you that five dollars is the utmost that she can spend on that tooth. Would you treat and fill the root, taking at least two radiographs, and fill the tooth likewise for that sum? Or would you extract that girl's tooth?"

A few days later a correspondent, writing of the poor fees obtainable for dental service, declares it to be his opinion that half of all the dentists fail to earn as much as three dollars per hour. Of root canal work he says: "For teeth requiring pulp removal with all treatment and final filling, five dollars is an exceptional price. Three dollars and a half is more commonly paid. I have lost a number of good families by the five dollar charge." Later on he tells us: "It is a fact that a great majority of patients are unable to pay large fees. They are supporting their families on from \$800 to \$1,500 a year. Mechanics earn good pay for perhaps eight months every year, no more. Clerks, small business men, saleswomen, nine-tenths of the lawyers, ministers and physicians struggle to maintain their dignity on \$2,000 a year. Their family expenses keep them guessing."

Another dentist writes: "The use of the X-ray in root canal work is undoubtedly the best and most scientific way, but how can a dentist follow that method for patients who cannot pay over five dollars for

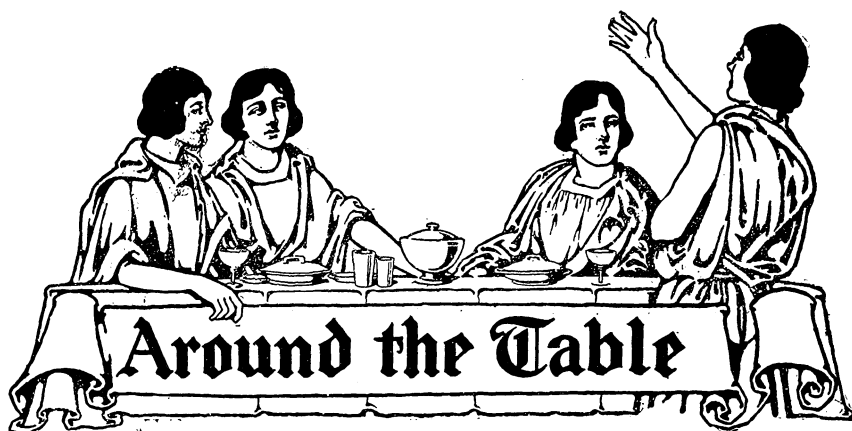


the entire service? What are you going to do for the great majority of the people? The state of affairs as it appears to ninety per cent. of the dentists of this country is not so much that the patient is unwilling to pay, but rather that he is unable to afford the fees for high grade services."

These facts and these questions bring the dental profession face to face with a grave problem. The research worker tells us that imperfect root canal fillings may produce serious systemic lesions. The radiographer tells us that his findings prove the correctness of these views, but adds that with the aid of the X-ray, roots can be properly filled and aseptic conditions maintained. Then comes the plain dentist, not the one with the rich clients, but just the plain dentist working for plain people, and he asks, "How can I do my root fillings and get the radiographic work done, or do it myself, for the prices that my people can afford to pay. What shall I do?"

What shall we reply?





I HAVE JUST been to Boston. Spent all the morning in the Forsyth Dental
 ❖ Infirmary for Children. Wonderful place, but I can't tell you about it
 ❖ now. Spent the evening at a banquet. In New York after a banquet the
 ❖ boys usually get together in the grill for a little bite and a convivial
 ❖ talk, and all through that Boston banquet I was looking forward to the
 ❖ post-post-prandial, either in the English Room at the Thorndyke, where
 ❖ they have nice little corners for eight, fenced off from the madding
 ❖ crowd, or else at my own hotel, the Copley Plaza. And I certainly
 ❖ counted on some rare material for this department if I could but get
 ❖ a few of the intellectual spokes that radiate from the Hub of the uni-
 ❖ verse, into that happy frame of mental exuberance where they could
 ❖ radiate to advantage—to my advantage, and yours.

■ ■ ■

BUT SAD TO RELATE nothing like that eventuated. I discovered that
 ❖ Boston retires at midnight. Observe that I said "retires." That is what
 ❖ the Bostonese do. When I retire, I just simply go to bed; but I do not
 ❖ go to bed at sixty minutes past eleven P.M. How can I? I live in New
 ❖ York. But I was in Boston you remark? True enough, and fact is I
 ❖ did go to bed, but I did not retire. I just lay abed thinking. Perhaps I
 ❖ may be able to interest you in my cogitations; perhaps not. Decide for
 ❖ yourself. Stop reading this as soon as you feel bored. But be fair!
 ❖ If you do read this to end, then you must admit that the reflections have
 ❖ touched a responsive chord. I hope they will.

■ ■ ■

DID YOU EVER try to rethink, or let us say recollect your thoughts? You
 ❖ just let your mind drift, and at the end you are surprised to find that you
 ❖ are thinking about the Venus de Medici, and that startles you, because
 ❖ you distinctly remember that at the beginning you were ruminating
 ❖ about the mortgage on your office furniture, and you wonder how you
 ❖ ever passed from one to the other. If you succeed in retracing your
 ❖ mental steps you will find that there was a perfect sequence from your
 ❖ mortgage to the stone lady. So it was with me. When I awoke this
 ❖ beautiful Sabbath morning I remembered that I was thinking of Æsop's



Items of Interest

- ❖ fables when I slipped off into dreamland, and I recollected that I had
- ❖ been thinking of the newest method of making porcelain crowns, at
- ❖ first. So, now as I sit in this comfy Pullman, I shall endeavor to re-
- ❖ arrange the links of thought into a chain that perhaps may prove a
- ❖ worthwhile Sunday sermon, which may tend to bind some of us more
- ❖ closely together into one grand and genevous brotherhood.

■ ■ ■

AT FIRST I RECALL that I was thinking of a little talk I had had two days
❖ ago with Brother Legro, of Detroit, when he partook of luncheon with
❖ me at the Café Des Beaux Arts. So that, by the way, it began Around
❖ the Table after all.

■ ■ ■

ON LAST MONDAY night Dr. Legro read a paper describing his method of
❖ constructing porcelain molar and bicuspid crowns. The wonderful fea-
❖ ture of the Legro crown is that you can reproduce cusps, ridges, grooves,
❖ sulci and fossæ, just as accurately as can be done in gold with a casting
❖ machine. It is not my intention here to describe the method, for this is
❖ not to be a practical preachment, but merely a moralizing memory of
❖ that midnight meditation. At least, however, I must tell you that Legro
❖ first bakes a thin button of porcelain, just thick enough to represent the
❖ occlusal or cusped portion of the crown. This porcelain occlusal cusp,
❖ by Legro's ingenious method, can be accurately attached to the remainder
❖ of the crown, so that in the finished structure, it will accurately occlude
❖ with the antagonizing teeth of the opposing jaw.

■ ■ ■

LEGRO THOUGHT THAT the entire process was original with himself.
❖ And I guess it was. However, while at luncheon with me, he confided
❖ the fact that while visiting the office of Dr. F. T. Van Woert, he had
❖ been chagrined to have the party of the second part, to wit, F. T. Van
❖ Woert, prove that he, the aforesaid Van Woert, was, or had been, the
❖ party of the first part, insomuch as he was able to reach a hand into a
❖ drawer, and draw it out fairly well filled with porcelain occlusal cusps,
❖ the same having rested more or less uselessly in said drawer for some
❖ six or seven years.

■ ■ ■

IN THE EARLY hours of this Sabbath morning, long before the sun arose
❖ in that quarter, which makes it ever a symbol of the fact that out of the
❖ East came the Three Wise Men who discovered Him who was to teach
❖ unto mankind the brotherhood of man, I pondered over the problem of
❖ why members of the dental fraternity so often are unfraternal, one to
❖ the other.

■ ■ ■

I DID NOT ARRIVE at this view of the matter at the outset. At first I was
❖ thinking of Legro's disappointment at discovering that a part of his
❖ method had been thought of by another man, before he himself had
❖ thought it out. And then I began to study out why and how it had
❖ happened that Van Woert had thought of it. And from that I wandered
❖ over several interesting facts that I could recall from the past.



LEGRO MADE A BUTTON of porcelain representing the occlusal surface
❖ of a molar. Long before that Van Woert made a button of porcelain,
❖ which represented the occlusal surface of a molar. Query? Does the
❖ last fact rightfully destroy Legro's claim to have produced a useful and
❖ an original thing? Let us see!



VAN WOERT MADE HIS porcelain occlusal buttons in the following man-
❖ ner. From the regular stock of one of the tooth manufacturers he
❖ selected certain molars and bicuspid, and ordered these delivered to him,
❖ fused only to the biscuit stage. He cut away all but the occlusal portion,
❖ and returned these to be fully fused. His idea was to utilize these as the
❖ tops, or occlusal surfaces of hand-made porcelain crowns. And the only
❖ reason why he had so many on hand when Legro called, was that the
❖ nice little scheme proved a failure.



THESE READY-MADE porcelain occlusal buttons could not be made to
❖ properly occlude with natural teeth any more than ready-made gold oc-
❖ clusal buttons, which some manufacturers have supplied in times past,
❖ when it was the ridiculous fashion to grind the top off of a porcelain fac-
❖ ing and solder on a gold occlusal tip, united to the backing of each
❖ unit, in alleged bridgework.



BUT WE CAN GO STILL FARTHER back with the occlusal button propo-
❖ sition. I cannot recall just how many years ago it was, but it is on
❖ record, because we published the method. However long ago it may
❖ be, Van Woert one day invited me over to see a new method he had
❖ devised. And I may say that whenever he has worked out anything
❖ novel, he has always given me first peep at it. This time it related to
❖ amalgam. His idea was to take impressions of natural teeth, fill these
❖ flush with amalgam in the molar and bicuspid regions, and when the
❖ amalgam had set he would have a number of buttons of amalgam each
❖ of which would be an accurate reproduction of the occlusal surface of a
❖ molar or a bicuspid.



THESE AMALGAM OCCLUSAL buttons were to be kept on hand, and being
❖ copies of natural teeth, he thought that they could be roughened on the
❖ under side, and placed on the top of fresh amalgam in a tooth, so as to
❖ unite and form a practically perfect amalgam filling, with occlusal sur-
❖ face in beautiful imitation of Nature.



ENTHUSIASTICALLY WE TWO proceeded to try the experiment. We
❖ packed amalgam into impressions of good natural teeth and obtained oc-
❖ clusal buttons that were beautiful. Then we took occluded plaster casts,
❖ carved cavities in molars and bicuspid, filled them with fresh amalgam,
❖ added the appropriate occlusal buttons, and had the satisfaction of see-
❖ ing the two unite perfectly.



THEN ONE OF US, I think it was myself, rushed into print, describing
❖ this process in the *Dental Cosmos*. I can't give the exact volume be-



- ❖ cause very stupidly the Pullman people seem to have omitted the *Cosmos*
- ❖ from the library on this train.

■ ■ ■

LATER ON, I TRIED the method in the mouth, and it was unsuccessful.

- ❖ Van Woert tried it, but his success was only a little better than mine.
- ❖ Trouble was in those days we had no real quick setting amalgam.
- ❖ Whether it could be done with the amalgams of to-day I do not know.

■ ■ ■

THINKING OF OCCLUSAL buttons made me think of another one, and

- ❖ this little story indicates how one man's idea is but the outcome of what
- ❖ another man teaches him. Dr. Norman W. Kingsley originated the following method of making a gold crown that would properly articulate.
- ❖ He would fit a band over the root to be crowned, fill it with plaster of Paris, have the patient close the jaws, and keep them closed until the plaster had thoroughly set. The band was then removed with the plaster adhering to it, and would be transferred to a fresh batch of plaster built into a little mound on a bit of cardboard, and when this plaster had set it was trimmed into the pyramidal form suitable for a zinc die. The top of this plaster model for the metal die carried the gold band, in which was the plaster which represented the bite. This plaster was then carved into the form of the occlusal surface of the tooth for which the crown was being made, and the circumference of this plaster was trimmed away sufficiently to fully expose the edge of the gold band.

■ ■ ■

WITH A METAL DIE made from this carved up model, Kingsley could

- ❖ stamp up a gold cusp which would exactly rest upon and match the gold band, and he could solder the two together so as to show scarcely any seam. I never could carry out the method with sufficient accuracy to make a thoroughly satisfactory union of the band and cusps.

■ ■ ■

TO RENDER THE UNION of the band and cusp portion more easy I

- ❖ adopted the following variation of the method. First I melted up small scraps of twenty karat gold into small balls, gold shot one might say.
- ❖ This I could sprinkle into my stamped cusps, and then with a few bits of solder unite the whole into a solid mass. By holding this solder side of the button against a flat grindstone I easily squared this surface perfectly smooth. I could then rest this gold occlusal button on top of my gold band, and one blast of the blowpipe would unite the two, giving me a crown with a solid top. Here then is one more version of the idea of using an occlusal button constructed first and then united with the rest of the crown subsequently.

■ ■ ■

ONE DAY A PATIENT PRESENTED with a tooth which I desired to

- ❖ crown, but the bite was so close that I could not make a crown by first constructing a band and then stamping up a cusp to be united with the band. Under the compulsion of necessity I proceeded to attempt a crown without dies. To the upper surface of my band I soldered a floor (or roof if you prefer) of platinum, allowing the platinum temporarily to extend beyond the band in all directions. On top of the platinum I then melted pure gold, allowing it to assume the globular form always result-



- ❖ ing from the cooling of the melted metal. This crown, with perfectly
- ❖ smooth top, was then placed in the articulator, and the occlusal surface
- ❖ carved with burs in the engine. The method entailed a great deal of
- ❖ work, and was only warranted, if ever, when the bite was very short.

■ ■ ■

AT THIS POINT I remembered the crown devised by Dr. Chayes, which I

- ❖ have, no doubt was entirely original with him, though its first principle
- ❖ is much like the last crown described. Chayes makes a band of iridio-
- ❖ platinum, roofed over with the same metal, the band and roof being
- ❖ united with platinum solder. Chayes then coats this completely with
- ❖ wax, and carves this wax into proper shape and occlusion. The wax is
- ❖ then replaced with gold by the casting process. Chayes had the ad-
- ❖ vantage of the casting process for melting his gold, whereas I had only
- ❖ a blowpipe. Therefore he could do his carving in the wax, whereas I
- ❖ was obliged to carve the metal itself. Of course, the Chayes crown is
- ❖ far superior, yet if he had a patent upon it, and there should arise any
- ❖ occasion for disputing his patent, unscrupulous litigants could use my old
- ❖ and abandoned method as an argument for breaking the patent, making
- ❖ much of the unessential points of similarity, and belittling the really im-
- ❖ portant differences.

■ ■ ■

SIMILARLY, SUPPOSING THAT LEGRO had taken a patent on his crown,

- ❖ which, of course, he has not, someone knowing of the porcelain occlusal
- ❖ buttons of Van Woert, someone at the factory where they were made,
- ❖ let us say, might easily give evidence which might break the patent.

■ ■ ■

YET THE TRUTH is that Legro with his porcelain crown, and Chayes with

- ❖ his cast gold crown, each has provided for us a method by which a crown
- ❖ can be produced which, to the highest state of perfectness, will replace
- ❖ the lost organ. A crown of proper form, with accurate approximal con-
- ❖ tacts, and with correct occlusion. A crown, the occlusal surface of which
- ❖ will show cusps, planes, grooves, sulci and marginal ridges correctly
- ❖ carved and correctly reproduced. I say carved and reproduced, because
- ❖ in each instance the pattern is first made and carved in wax, so that at
- ❖ that stage it may be tried in the mouth and may be made absolutely per-
- ❖ fect. Then in the Legro crown the wax pattern is exactly reproduced in
- ❖ porcelain, just as the Chayes crown is reproduced in cast gold.

■ ■ ■

BOTH MEN, IN REACHING the goal of real achievement, have trod some-

- ❖ what along the paths already started by others, but the important fact
- ❖ which should be emphasized and remembered, but which is usually be-
- ❖ littled, is that these men carried the processes further, finally reaching
- ❖ complete success, whereas their predecessors really abandoned their
- ❖ efforts as failures.

■ ■ ■

A SINGULAR CIRCUMSTANCE is that a vital claim for the Chayes crown

- ❖ is that by the method the occlusal surfaces can be accurately produced,
- ❖ and in the illustration used with my own published description we find
- ❖ that the occlusal surface shows well-defined cusps and sulci. True the
- ❖ picture shows an upper molar with five cusps, but that was a mere detail;



- ❖ a detail supplied by the artist. The sulci that look so well in the picture
- ❖ were likewise furnished by the artist. Certainly they could not have
- ❖ been considered essential by me, because if I had ever carved such deep
- ❖ sulci in solid gold crowns, with revolving engine burs, twenty-five years
- ❖ age, I should never have needed J. Lowe Young to tell me to carve
- ❖ sulci in the wax patterns of my gold inlays less than five years ago.
- ❖ Yet that article of mine and the illustrations that were published with
- ❖ it, could be used to break Chayes's patent—if he had one.



SIMILAR ARTICLES AND SIMILAR illustrations have been used to break

- ❖ patents more than once, the articles and the illustration, in the light of
- ❖ the later discoveries, being given a meaning that they never had when
- ❖ first printed.



IN THIS MANNER have we at times crucified those that have served us.

- ❖ Strange it is that we never seem to realize that the man who gives us a
- ❖ method, which provides for us an easier or a better way of doing some-
- ❖ thing, if encouraged, and praised, and thanked, might use his inventive
- ❖ talent to find us an easier or a better way of doing something else.



SOMEWHERE ABOUT HERE I thought of the fable of the Goose that

- ❖ laid the Golden Eggs, and of the Foolish Farmer who killed the Goose
- ❖ to get more eggs more quickly, only to discover after the Goose was
- ❖ dead that a Dead Goose produces no Eggs. And as I drifted into dream-
- ❖ land I was thinking of Æsop, and wondering if he would consider that
- ❖ dentists are Foolish Farmers!





The Forsyth Dental Infirmary.

To the Editor of ITEMS OF INTEREST:

I beg the courtesy of your pages for a reply to your editorial in the January number, on what you consider the inadequacy of the Forsyth Dental Infirmary.

It was never proposed nor intended that the Forsyth Infirmary should care for the teeth of *all* the school children of Boston. Your statement that it cannot do what it was never intended to do seems therefore hardly a sound criticism.

When the Infirmary was first considered, it was found that a large number of Boston school children, mounting into the thousands, were in what might be called the "dispensary class" in regard to dental matters. That is, they could not afford to pay a private dentist for the work needed on their teeth. The Infirmary was planned to provide at a merely nominal fee of a few cents the surgical facilities needed by these children, and not adequately supplied by the then existing clinics. Free dentistry for the whole school population was never considered. The Infirmary has now provided what it set out to provide. The fact can easily be proved by making use of your own calculations, writing the correct figures in place of certain totals which you have apparently misunderstood. Very briefly, here is the demonstration.

In the year 1912-13, there were in the Boston schools not 122,000 children with defective teeth, as you have stated; but a total of 122,000 mouth defects of all kinds reported by the school physicians. If your figures had been correct, they would have meant that more than ninety-five per cent. of the total of 128,000 children in the public and parochial schools had defective teeth. You would perhaps not care to defend so extreme an estimate.

Children with defective teeth were reported in the year named to a total of 66,560. Of these, 42 per cent., or about 28,000 individual children, were taken care of by private dentists, under the direction of their parents. Assuming what is not at all true, that the remaining 38,560



belong in the dispensary class, and that the Infirmary, as you estimate, would have to care for 80 per cent. of these, the Infirmary's charge would amount to 30,850 children a year. Assuming further your estimate of four carious teeth to each child would give us a total of 123,400 operations a year. For handling these you have credited the Infirmary, with only a part of its staff in, with 400 working hours a day for 305 working days in the year. This gives one hour, your allowance, for each operation.

This, please note, is for a partial staff, supposed to be dealing with the maximum possible number of patients. In point of fact, careful studies extending over several years have shown that the dental dispensary class in the public schools of Boston is well below a total of 20,000. We shall never have to deal with the 38,000 assumed for the purpose of these calculations. Your computation of a total of 390,000 operations a year is due to the mistake of multiplying the four jobs per patient into the total number of mouth defects of all kinds, instead of into the number of children with defective teeth, as is here done.

Actual experience shows that the Infirmary is doing much better than even your corrected calculations provide for. In the first seventeen working days of January, the Infirmary has treated 591 patients, performing on them a total of 3,818 operations of all kinds—including fillings, extracting, and cleaning. Each child was sent away with his mouth clean, and every possible repair finished. This averages a little over six operations per patient, for which your time calculations give us a total of 6,800 working hours, or about 1.7 hours for each operation. With the Infirmary staff full, your figures would give us a little over three hours for each operation, instead of the one hour you have set as a standard.

I trust this brief discussion will convince you that the work of the Forsyth Dental Infirmary was planned with full knowledge of the facts, and that ample provision has been made for doing all the work that the Infirmary set out to do. We expect, as our work of education progresses, that the total of decayed teeth among Boston school children will be sensibly reduced.

As to dental nurses in the schools. It has always been my personal attitude, that children should be taught at the earliest age to clean their own teeth, themselves, regularly and effectively. The Infirmary, both directly and through its social service department, will do its utmost to instruct its young patients and their parents to this effect. I consider the dental nurse plan you have advocated neither desirable in principle, nor in the long run effective, since it would stand in the way of creating in the child the habit of daily thorough cleansing of its own teeth. No other prophylaxis than this habitual daily cleaning of one's own teeth will ever reach high efficiency.

JOHN F. DOWSLEY.



NOTE OF REPLY.—It has not been the intent of the editor either in the January or in the February editorial to criticize the conduct of the Forsyth Infirmary, or to expound the intentions of the Board of Directors, in regard to which he was in total ignorance. The entire dental world, however, must be interested in this Infirmary, and the editorials merely discussed the possibilities of such an institution. Dr. Dowsley says that the writer would scarcely care to defend an estimate of ninety-five per cent. of dental defectives in the public schools. No one can tell definitely until an examination shall have been made by experts. According to Dr. Fones's report his hygienists have found an average of six cavities per child in one hundred per cent. of the four thousand children examined. Dr. Dowsley is quite right when he tells us that children must be taught to clean their own teeth, but thus far dentists have utterly failed to accomplish this, whereas Fones with his school dental hygienists is succeeding in this undertaking for the first time in the history of the world.—THE EDITOR.

Dental Dispensaries in Boston.

To the Editor of ITEMS OF INTEREST:

I have your magazine, *ITEMS OF INTEREST*, and in connection therewith beg to say:

You quote a paragraph from my speech at the opening of the Forsyth Dental Infirmary, as follows:

"With the establishment of this Infirmary, so wisely conceived and so patriotically carried out, the community can feel assured that every child in the Boston Public Schools will have all possible defects remedied before leaving school; and consistent with incurable physical limitations, these children will have a straight road from their education into their chosen paths of life." And then say: "This means that all the defective teeth of the children of the Boston Public Schools can be cared for by the Forsyth Dental Infirmary."

I did not mean anything of the kind and I did not say this.

There were 128,000 children in the Boston Public Schools examined.

Sixty-five per cent. of all these children were found to be defective in some form.

Eighty per cent. of the defects found were centered in the mouth.

In other words, the total number of defective children in the Boston schools was about 83,000, and all of those with mouth defects were 66,560. These, of course, include all kinds of mouth defects other than teeth.



Dr. Gallivan says that there are 58,000 children with defective teeth, and I think this is a minimum figure.

You are confusing the 58,000 children with the 122,000 defects found, which is quite a different matter, because one child might have two or three or even more defects, which would add to that total.

If you look at the report of my speech in your magazine, you will see that I said: "Of the total number of defective children found, forty-two per cent. of them were returned to the schools at the beginning of the next year with these defects cared for by the parents through the family physician." Our whole program was based on the theory that all the city should do is to find out what the defects in the children in the schools are and notify the parents. Generally speaking, except in cases of poverty or ignorance, the parent will see to it that the defects to which attention is thus called, are cared for, and although we are not yet far enough along to know what percentage of the whole these cases are, it is not so large as to be formidable.

We have, therefore, 66,000 mouth defects in one year, of which parents have taken care of forty-two per cent., leaving a balance of about 34,000 children having defects centering in the mouth, not all of which are dental defects: to be cared for in dispensaries or elsewhere; or less than 700 children a week.

Before the Forsyth Infirmary was built, Boston had four dental clinics: The Harvard and Tufts Dental Schools, the Massachusetts General Hospital, and the Boston Dispensary, with about 150 chairs for clinical use. With the Forsyth Infirmary, Boston has to-day 246 chairs.

Before the Forsyth Infirmary was started, some people who were interested in health matters in Boston, attempted to get these four dispensaries to open their doors six days in the week for children instead of one day as they were then doing; with the exception of Tufts Dental School all refused to do it. It will be seen, therefore, that all the existing clinics will have to do will be to use each of the existing chairs three times a week; to care once for the maximum number of children needing clinical dental treatment. If each child averages four cavities, they can each be attended to, leaving ample opportunity, during the balance of the week, for adults and the other clinical purposes of these institutions.

The impression I intended to convey was that with the Forsyth coming into the field, a stimulus has been given to other dispensaries to utilize existing appliances to better advantage instead of only one day in the week. The remedy of the defects found in the children in the schools is fundamentally up to the parents, and our experience will show that they can be depended upon to look after at least fifty per cent. of the cases of defects found. As time goes on, this percentage of cases



treated by the family physician and dentist will increase. Or assuming that only forty-two per cent. of the defects found are cared for by the parents, the Forsyth, with the other existing dental clinics, have ample facilities to care for all the children in Boston needing such treatment for a good many years to come.

Respectfully yours,

EDW. F. MCSWEENEY.

NOTE.—The misinterpretation of Mr. McSweeney's figures was discovered by the Editor, and admitted in the editorial in February issue, which was in press before the receipt of the above letter.—THE EDITOR.

Dental Nurses.

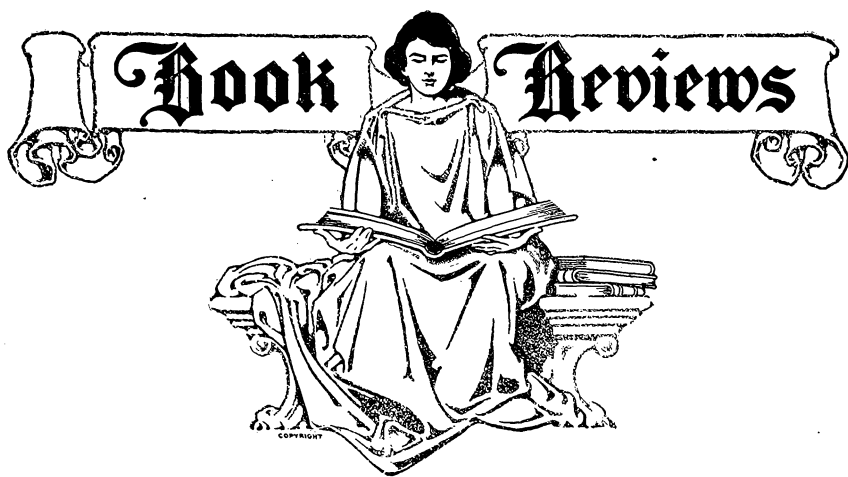
Editor ITEMS OF INTEREST,

Dear Sir:

Your article about the Forsyth Infirmary seems to me reasonable and not at all unfriendly. The amount of dental work to be done for school children is huge; and a single infirmary, even though a very good one, will not be able to deal with such a mass. The greatest obstacle I see to the progress of dental work among school children is the objection which many dentists make to the registration and employment of dental nurses. Many members of the profession seem to apprehend that widespread employment of dental nurses will diminish seriously the amount of work to be done by male dentists. This opinion is not sound, and ought to be promptly overcome. I remember very well hearing competent physicians and surgeons object to the establishment of schools for nurses on the ground that trained nurses would interfere with not only the practice of physicians and surgeons, but with their due authority. These evils have not followed from the general employment of trained nurses.

Sincerely yours,

CHARLES W. ELIOT.



Angle's Die Occlusionsanomalien Der Zähne.

Zweite Deutsche umgearbeitete und vermehrte Auflage mit 806 Abbildungen. Autorisierte Übersetzung von J. Grünberg, Orthodontist, Berlin. Redigiert von Dr. A. Oppenheim, Wien. Verlag von Hermann Meusser, 1913.

The volume before us for review is the second German edition of Angle's well-known seventh American edition of *Malocclusion of the Teeth*. The first German edition appeared in 1908, a year after its publication in America, and this early demand for a second edition is the best evidence of the interest our German colleagues take in this phase of dental practice. The seventh American edition is not yet exhausted, and thus proves again the soundness of the charge so frequently made by publishers, viz., American dentists are poor book buyers.

The work has been considerably enlarged, containing many of the more recent advances in this field which were not included in the American edition. The translator and editor are to be congratulated on their skill and thoroughness. The mechanical perfection displayed by the publishers have probably never been surpassed.

The enlargements in the text largely occur in the chapters on diagnosis, on the tissues of attachment and the changes due to tooth movement, on regulating appliances, on anchorage and retention. Many new illustrations are introduced by the translator, which add greatly to the practical value of the book.

Everyone interested in this subject who is able to read the German language will find the volume a valuable addition to his library. The only



criticism of consequence that can be made is that which applies equally to its predecessors by the same author, viz., it is too orthodox in much of its teaching, and too oblivious to the historical point of view. Because of its many excellent practical methods, most students have overlooked the above-mentioned shortcomings; but these, nevertheless, militate against its use as a college text-book.

B. E. L.

Oral Anesthesia.

By KURT HERMANN THOMA, D.M.D.

Publishers: Ritter & Flebbe, 120 Boylston St., Boston, Mass.

The author deals with his subject very thoroughly in eight (8) chapters. Under the heading of "Anatomy of the Oral Cavity" follows the "Osteology of the Maxilla and Mandible," with a clear description of the first, second and third division of the fifth cranial nerves, liberally illustrated by photographs from actual specimens and schematic drawings.

The third chapter gives the topography of the soft tissues covering the upper and lower jaw on the buccal and palatal side and their relation to the old and new method of infiltration anesthesia.

In describing the pterygo-mandibular space the author claims that the inferior alveolar nerve in a horizontal section through the human head is the place "in which mandibular conductive anesthesia is best accomplished," which is contrary to other findings.

Under "Pharmacology" a complete description of novocain and suparenin syntheticum, including formula, chemical and physiological properties, dosage, etc., are given.



Seidel's sixteen theses on novocain suparenin solution are a very important part of this paragraph. They are well and clearly translated.

After describing Seidel's method of preparation of the solution the author recommends the tablet for daily use, and especially Tablet T. (after the author's own formula) which promises to replace all others in use in the near future.

The fifth and sixth chapters are devoted to the instrumentarium and the preparing of the solution. They are both very instructive and must necessarily be of great help to the student of local anesthesia.

In the chapter on "Local Anesthesia" proper the author illustrates schematically the different methods; a glance at Fig. 31 makes further description seem superfluous. On account of the nerve-supply of maxilla and mandible, dental and surgical anesthesia is recognized.

Preparation of patient and of place for insertion of the needle are very important. The author's method of pterygo-mandibular injection—



Items of Interest

while undoubtedly answering the purpose—seems too complex and may discourage the beginner: right and left hand should be used for the respective sides to simplify the technique. Of the conductive anesthetics in the maxilla the zygomatic injection, as described by the author, is a distinct improvement over all the old methods. Infraorbital injections should also be given with both hands and the index finger *only* used for palpation.

Failures and ill-effects are admirably dealt with in the next chapter; it will be of great assistance especially to the beginner.

The book closes with a paragraph on the practical application of local anesthesia. Four very instructive tablets are shown and the subject dealt with under the headings of operative dentistry, crown and bridge-work, exodontia and oral surgery.

In writing this volume the author has shown himself not only to be a master of the subject, but also extremely capable of transmitting to others in a clear and concise manner what he himself knows. It must be highly recommended to everybody.

T. B.





National Society Meetings.

PANAMA-PACIFIC DENTAL CONGRESS, San Francisco, Cal., August 30 to September 9, 1915.

Secretary, Dr. Arthur M. Flood, 240 Stockton St., San Francisco, Cal.

State Society Meetings.

ALABAMA DENTAL ASSOCIATION, Montgomery, Ala., April 13, 1915.

Secretary, Dr. J. A. Blue, Birmingham, Ala.

ARIZONA STATE DENTAL SOCIETY, date and place will be announced later.

Secretary, Dr. J. L. O'Connell, Phoenix, Arizona.

ARKANSAS STATE DENTAL ASSOCIATION, Little Rock, Ark., May 13-15, 1915.

Secretary, Dr. W. B. Dormon, Nashville, Ark.

COLORADO STATE DENTAL ASSOCIATION, June 17, 18, 19, 1915.

Secretary, Dr. Earl W. Spencer, 119-120 Pope Block, Pueblo, Colo.

CONNECTICUT STATE DENTAL ASSOCIATION, Hartford, Conn., April 20-22, 1915.

Secretary, Dr. E. R. Bryant, New Haven, Conn.

FLORIDA STATE DENTAL SOCIETY, date and place will be announced later.

Secretary, Dr. Alice P. Butler, Gainesville, Fla.



ILLINOIS STATE DENTAL SOCIETY, Peoria, Ill., May 11-14, 1915.

Secretary, Dr. Henry L. Whipple, Quincy, Ill.

INDIANA STATE DENTAL ASSOCIATION, Indianapolis, Ind., May 18-20, 1915.

Secretary, Dr. A. R. Ross, Lafayette, Ind.

IOWA STATE DENTAL SOCIETY, Waterloo, Ia., May 4-6, 1915.

Secretary, Dr. C. M. Kennedy, Des Moines, Iowa.

KANSAS STATE DENTAL ASSOCIATION, Topeka, Kans., April 27-29, 1915.

Secretary, Dr. A. L. Benton, Garnett, Kansas.

KENTUCKY STATE DENTAL ASSOCIATION, Ashland, Ky., June 8-10, 1915.

Secretary, Dr. Chas. R. Shacklette, The Atherton Bldg., Louisville, Ky.

LOUISIANA STATE DENTAL SOCIETY, Grunewald Hotel, New Orleans, La., June 3-5, 1915.

Secretary, Dr. P. Trowbride, Franklin, La.

MARYLAND STATE DENTAL ASSOCIATION, Baltimore, Md., June 11-12, 1915.

Secretary, Dr. F. F. Drew, 701 N. Howard St., Baltimore, Md.

MASSACHUSETTS DENTAL SOCIETY, Boston, Mass., May 5-7, 1915.

Secretary, Dr. A. H. St. C. Chase, Everett, Mass.

MINNESOTA STATE DENTAL ASSOCIATION, date and place will be announced later.

Secretary, Dr. Max E. Ernst, 614 Lowry Bldg., St. Paul, Minn.

MISSISSIPPI DENTAL ASSOCIATION, Jackson, Miss., April 20-22, 1915.

Secretary, Dr. M. B. Varnado, Osyka, Miss.

MISSOURI STATE DENTAL ASSOCIATION, Golden Jubilee Meeting, Jefferson City, June 10-12, 1915.

Secretary, Dr. S. C. A. Rubey, New York Life Bldg., Kansas City, Mo.

MONTANA STATE DENTAL SOCIETY, date and place will be announced later.

Secretary, Dr. F. W. Adams, Chicago Block, Billings, Montana.

NEW HAMPSHIRE STATE DENTAL SOCIETY, Weirs, N. H., June 22-24, 1915.

Secretary, Dr. Louis I. Moulton, 15 No. Main St., Concord, N. H.

NEW JERSEY STATE DENTAL SOCIETY, Asbury Park, July 21-24, 1915.

Secretary, Dr. John C. Forsyth, 430 E. State St., Trenton, N. J.

NEW MEXICO STATE DENTAL SOCIETY, Albuquerque, N. M., date will be announced later.

Secretary, Dr. J. J. Clarke, Artesia, N. M.



Society Announcements

- NEW YORK STATE DENTAL SOCIETY, Albany, N. Y., May 13-15, 1915.
Secretary, Dr. A. P. Burkhart, 52 Genesee St., Auburn N. Y.
- NORTH CAROLINA DENTAL SOCIETY, Wrightsville Beach, N. C., June 23-25, 1915.
Secretary, Dr. R. M. Squires, Wake Forest, N. C.
- OHIO STATE DENTAL SOCIETY, Columbus, Ohio, December 7-9, 1915.
Secretary, Dr. F. R. Chapman, 305 Schultz Bldg., Columbus, Ohio.
- OKLAHOMA STATE DENTAL SOCIETY, Oklahoma City, Oklahoma, March 15-19, 1915.
Secretary, Dr. C. R. Lawrence, Enid, Oklahoma.
- PENNSYLVANIA STATE DENTAL SOCIETY, Reading, Pa., June 22-24, 1915.
Secretary, Dr. L. M. Weaver, Philadelphia, Pa.
- SOUTH CAROLINA STATE DENTAL ASSOCIATION, Columbia, S. C., April 13-16, 1915.
Secretary, Dr. Ernest C. Dye, Greenville, S. C.
- TENNESSEE STATE DENTAL ASSOCIATION, Sewanee, Tenn., June 24-26, 1915.
Secretary, Dr. C. Osborn Rhea, 625½ Church St., Nashville, Tenn.
- TEXAS STATE DENTAL ASSOCIATION, Galveston, Texas, May 19-22, 1915.
Secretary, Dr. W. O. Talbot, Fort Worth, Texas.
- UTAH STATE DENTAL SOCIETY will meet in San Francisco, Cal., during the Panama-Pacific Dental Congress in August, 1915.
Secretary, Dr. E. C. Fairweather, Boston Bldg., Salt Lake City, Utah.
- VERMONT STATE DENTAL SOCIETY, May 19-21, 1915.
Secretary, Dr. P. M. Williams, Rutland, Vt.
- VIRGINIA STATE DENTAL ASSOCIATION, Richmond, Va., Nov. 4-6, 1915.
Secretary, Dr. C. B. Gifford, Norfolk, Va.
- W. VIRGINIA STATE DENTAL SOCIETY, Wheeling, W. Va., April 14-16, 1915.
Secretary, Dr. J. W. Parsons, Huntington, W. Va.
- WISCONSIN STATE DENTAL SOCIETY, Oconomowoc, Wis., July 13-15, 1915.
Secretary, Dr. O. G. Krause, 1209 Wells Bldg., Milwaukee, Wis.

The Golden Jubilee Meeting of the Missouri State Dental Association

Has been postponed until June 10th, 11th and 12th. Elaborate preparations are being made to celebrate the semi-centennial meeting of this Association on an elaborate scale. See special announcements in next issue of the *Journal*. For information address

S. C. A. RUBEX, Secretary.

No. 1017 New York Life Bldg.,
Kansas City, Mo.



Second District Dental Society's Annual Dinner.

You are invited by the Second District Dental Society to attend the annual dinner and meeting on Monday evening, April 12th.

You are especially and particularly invited to bring a friend—whether or not you receive an invitation by mail.

Reserve this evening for a meeting that will signal a marked advance in scientific dentistry.

We want you to hear, we urge you to hear Dr. Elmer S. Best, of Minneapolis, Minn., read his paper, "The Responsibility of the Dentist in Pulpless Teeth." This is the result of over two years' experiment, study and trial. Dr. Clarence J. Grieves, of Baltimore, and other able men, will discuss this problem.

You will realize, we are confident, that the scientific world and the world of public opinion are placing upon the dental profession's services a valuation and a responsibility new, serious and portentous.

Dr. Best has a forceful, convincing and intensely earnest personality. What he says you feel sure is true. His sound conclusions are projected with a relentless logic and delightful delivery.

The dinner (informal, \$2.50 per person) and the meeting will be held in the new Hotel Bossert, Brooklyn. The beauty of its refined elegance and the perfection and completeness of its appointments and services are unsurpassed. If it is more convenient to stay over night, you may do so at reasonable rates. Tables for six and eight will be reserved upon receipt of check sent and made payable to Arthur M. Hunter, Treasurer of the Dinner Committee, 67 Hanson Place, Brooklyn.

A. M. NODINE, Chairman,

F. C. WALKER,

A. H. HUNTER,

Dinner Committee.

New Jersey State Dental Society.

The forty-fifth annual convention of the New Jersey State Dental Society will be held at Asbury Park, on July 21, 22, 23 and 24, 1915.

The headquarters will be located at the Coleman House. The ball room will be used for all meetings of the Society.

The glass-enclosed Casino over the ocean, just across the ocean drive from the Coleman House, has been secured for the exhibits and clinics. With over 2,000 more square feet of floor space than the pavilion used last year, there should be adequate room.

Dr. Chauncey F. Egel, of Westfield, N. J., is Chairman of the Ex-



hibit Committee, and reports that applications are already being made for space.

Dr. W. W. Hodges, of Perth Amboy, is arranging for an attractive list of clinics.

The Essay Committee, under the Chairmanship of Dr. James I. Woolverton, of Trenton, will have three essayists of prominence to present.

A cordial invitation to attend is extended to all ethical practitioners.

JOHN C. FORSYTH, *Secretary*.

430 E. State St., Trenton, N. J.

Illinois State Dental Society.

The fifty-first annual meeting of the Illinois State Dental Society will be held at Peoria, Ill., May 11-14, 1915. President, J. M. Barcus, Carlinville; Secretary, Henry L. Whipple, Quincy.

New Hampshire Board of Registration in Dentistry.

The annual meeting of the New Hampshire Board of Registration in Dentistry, for examination, will be held June 14, 15 and 16, 1915, at Masonic Banquet Hall, Manchester, N. H.

For application blanks or further information address

HARRY L. WATSON, *Secretary-Treasurer*.

913 Elm Street, Manchester, N. H.

North Carolina State Board of Dental Examiners.

The next regular meeting of the North Carolina State Board of Dental Examiners will be held at Wrightsville Beach, Wilmington, N. C., beginning promptly at nine o'clock on Monday morning, June 21st. Full information and application blanks may be secured by addressing the Secretary.

DR. F. L. HUNT, *Secretary*.

Asheville, N. C.

The Susquehanna Dental Association of Pennsylvania.

The fifty-second annual meeting of the Susquehanna Dental Association will be held at Irem Temple, Wilkes-Barre, Pa., May 18, 19 and 20, 1915.

GEO. C. KNOX, D.D.S., *Recording Secretary*.

Scranton, Pa.



Texas State Dental Association

The Thirty-fifth Annual Meeting of the Texas State Dental Association will be held in Galveston, Texas., May 19, 20, 21 and 22, 1915. The special feature of this meeting will be post-graduate lectures and clinic work.

Dr. G. Walter Ditmar, of Chicago, will present modern scientific bridgework and removable partial dentures, with preparations, technique, and principles involved. Dr. B. F. Thielen will present "Plate Work"; Dr. T. G. Duckworth, "Orthodontia"; Dr. R. D. Griffis, "Nitrous Oxide Analgesia, and Anaesthesia"; Dr. Julian Smith, "Pyorrhea"; Dr. J. M. Murphy, "Local Anaesthesia."

Exhibitors are requested to attend and to write Dr. A. L. Frew, Dallas, for space. General clinics, last day. Clinicians write Dr. W. H. Nugent, Fort Worth. For any other information write the Secretary.

W. O. TALBOT, *Sec'y-Treas.*,

C. M. McCauley, *Pres.*,
Dallas, Tex.

Fort Worth, Tex.

Massachusetts Board of Registration in Dentistry.

A meeting of the Massachusetts Board of Registration will be held in Boston, Mass., March 3-4-5, 1915. For applications and further information apply to the Secretary, Dr. G. E. Mitchell, 14 Water Street, Haverhill, Mass.

Odontological Society of Western Pennsylvania.

The thirty-fourth annual meeting of the Odontological Society of Western Pennsylvania will be held at the Monongahela House, Pittsburgh, Pa., Tuesday and Wednesday, April 13 and 14, 1915.

The first regular session of the society will open on Tuesday at 10:30 A. M.

The Executive Council will meet at the Hotel at 10 A. M., for the transaction of business in the interest of the society.

The clinics and exhibits will be at the Monongahela House. Exhibitors are cordially invited to visit this meeting, and requested to make early reservation for space. Address Dr. Leslie Waddill, Jenkins Arcade, Pittsburgh, Pa.

A cordial invitation is extended to all ethical dentists in Pennsylvania and adjoining States.

KING S. PERRY, *Secretary.*

719 Jenkins Bldg., Pittsburgh, Pa



Examination of Dentists for the U. S. Army.

The Surgeon General of the Army announces that examinations for the appointment of Acting Dental Surgeons will be held at Fort Slocum, New York; Columbus Barracks, Ohio; Jefferson Barracks, Missouri; Fort Logan, Colorado; and Fort McDowell, California, on Monday, April 12, 1915.

Application blanks and full information concerning these examinations can be procured by addressing the "Surgeon General, U. S. Army, Washington, D. C."

The essential requirements to securing an invitation are that the applicant shall be a citizen of the United States, shall be between 21 and 27 years of age, a graduate of a dental school legally authorized to confer the degree of D. D. S., and shall be of good moral character and habits.

Acting Dental Surgeons are employed under a three years' contract, at the rate of \$150.00 per month. They are entitled to traveling allowances in obeying their first orders, in changing stations, and in returning to their homes at termination of service. They also have a privilege of purchasing certain supplies at the Army commissary. After three years' service, if found qualified, they are promoted to the grade of dental surgeon with the rank of first lieutenant, and receive thereafter the pay and allowances appertaining to that rank.

In order to perfect all necessary arrangements for the examination, applications must be in the possession of the Surgeon General at least two weeks before the date of examination. Early attention is therefore enjoined upon all intending applicants. There will be nine vacancies to be filled.

Dental Society of the State of New York.

The forty-seventh annual meeting of the Dental Society of the State of New York will be held at Albany, N. Y., Thursday, Friday and Saturday, May 13-14-15, 1915.

The Executive Council will meet at the Hotel Ten Eyck Wednesday afternoon, May 12th, at 3 P. M., for the transaction of business in the interests of the society.

The first regular session of the society will open on Thursday at 10:30 A. M. The literary program will be rendered in the auditorium of the New York Educational Building. Headquarters for officers and Executive Council will be at the Hotel Ten Eyck.



The clinics and exhibits will be at the Hotel Ten Eyck. Exhibitors are cordially invited to visit this meeting and requested to make early reservations for space. Address Dr. O. J. Gross, Schenectady, N. Y., for space.

A cordial invitation is extended to all ethical dentists in New York and sister States.

A. P. BURKHART, *Secretary.*

52 Genesee St., Auburn, N. Y.

Lake Erie Dental Association.

The Fifty-second Annual Meeting of the Lake Erie Dental Association will be held at the Hotel Bartlett, Cambridge Springs, Pa., May 20th to 22nd.

DR. J. F. SMITH, *Secretary.*

Erie, Pa.



